Technical Publications

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Rev. 004

Vivid 3 User's Guide

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Operating Documentation

Regulatory Requirements

The Vivid 3 Systems meet the provisions of the European Council Directive 93/42/EEC concerning medical devices which apply to them.

Conformity assessment was performed according to Annex II by KEMA.

Any changes to accessories, peripheral units or any part of the system must be approved by the manufacturer, GE Medical Systems. Ignoring this advice may compromise the regulatory approvals obtained for the product.

Requirements given by local laws/acts/ordinances must be followed by the user/installer. [For example, German: German Medical Device Act (Medizinproduktegesetz) and German Medical Device Ordinance (Medizinprodukte-Betreiberverodnung).]

CE 0344

GE ULTRASOUND ISRAEL PRODUCTS:

GE ULTRASOUND ISRAEL products are tested to meet all applicable requirements in relevant EU Directives and European/International standards (See “Standards used below”.)

Any changes to accessories, peripheral units or any part of the system must be approved by the manufacturer, GE Ultrasound Israel. Ignoring this advice may compromise the regulatory approvals obtained for the product.

Please consult your local **GE ULTRASOUND ISRAEL** representative for further details.

GE ULTRASOUND EUROPE, Regulatory Affairs Dept. Beethoven Str. 239,Solingen Germany, tel +49-(0)212-2802-243, has been empowered to enter into commitments on our behalf in any matter concerning the provisions of the 93/42/EEC directive.

Standards used:

To fulfill the requirements of relevant EC directives and/or European Harmonized/ International standards the following documents/standards have been used:

Standard/Directive	Scope
89/336/EEC	EMC Directive
93/42/EEC	Medical Device Directive
IEC 801-2	Electrostatic Discharge
IEC 801-3	Radiated Electromagnetic Field
IEC 801-4	Electrical Fast Transient/Burst
IEC 805-1	Surge
EN 55011/CISPR 11	Electromagnetic Susceptibility
EN 60601-1/IEC 601-1/UL 2601-1	Medical Electrical Equipment; General Requirements for Safety
EN 61157/ IEC 61157	Requirements for the declaration of the acoustic output of medical diagnostic ultrasonic equipment
IEC 60601-2-27	Medical electrical equipment - Part 2: Particular requirements for the safety of electrocardiographic monitoring equipment.
IEC 60601-1-4	Medical electrical equipment: Part 1-4: General requirements for collateral standard: Programmable electrical medical systems
ISO 10993-1	Biological evaluation of medical devices
ISO 13485	Quality management standards for medical devices

GE Medical Systems

MEDICAL ELECTRICAL EQUIPMENT
CLASSIFIED BY UNDERWRITERS LABORATORIES INC.
WITH RESPECT TO ELECTRIC SHOCK, FIRE , MECHANICAL HAZARDS
ONLY IN ACCORDANCE WITH UL 2601-1 AND
CAN/CSA C22.2 NO. 601
E178816

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Revision History

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1	August 2002	New Software Version
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3	June 2005	WEEE, Regulatory Requirements
4	December 2005	New Software Version

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Please verify that you are using the latest revision of this document. Information pertaining to this document is maintained on GPC (GE Medical Systems Global Product Configuration). If you need to know the latest revision, contact your distributor, local GE Sales Representative or in the USA, call the GE Ultrasound Clinical Answer Center at 1-800-682-5327 or 262-524-5698.

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About this Guide

For additional information, see *Chapter 1, Introduction* in the **Vivid 3 User's Manual**.

Safety

Ensure that the appropriate safety precautions are taken before operating the **Vivid 3** ultrasound unit.

Important: All information in *Chapter 16, Safety*, should be read and understood *before* operating the **Vivid 3** ultrasound unit.

Prescription Device

For USA Only

CAUTION United States law restricts this device to sale or use by, or on the order of, a physician.

Contraindications

The GE **Vivid 3** ultrasound unit is not intended for opthalmic use or any use causing the ultrasound beam to pass through the eye. The acoustic levels at which this system operates exceed the FDA limits for opthalmic use.

Interference Caution

Devices not to be used near this equipment

Devices which intrinsically transmit radio waves such as cellular phones, radio transceivers, mobile radio transmitters, radio-controlled toys, and so on, should not be operated near the GE **Vivid 3** ultrasound unit.

Medical staff in charge of the unit are required to instruct technicians, patients, and other people who may be around the **Vivid 3** ultrasound unit, to fully comply with the above recommendations.

CAUTION Do not use the devices listed in the previous paragraph near the **Vivid 3** ultrasound unit. Use of these devices near the unit could cause malfunction.

Conventions Used in this Manual

Typographic Conventions

The following typographic conventions are used to assist in the identification of different types of information.

Bold type	Denotes buttons, soft keys, soft key rotaries and field names that are displayed on the screen.
Italic type	Denotes the names of windows, screens and dialog boxes, for example, *New Patient* window.
<key>	Indicates the names of function keys on the alphanumeric keyboard.
NOTE:	Notes provide additional important information about the subject under which they are located, for example, exceptions to a general rule.
Important:	Indicates an important note or a hint.

From here forth:

- The **Vivid 3** ultrasound unit will be referred to as the System.
- The **Vivid 3 User's Manual** 2300163-100, Rev. 0 will be referred to as the User's Manual.
- The **Vivid 3 ReferenceManual** 2300165-100, Rev.1 will be referred to as the Reference Manual.

Alert Icons

The following icons highlight safety issues:

CAUTION WARNING DANGER

For additional information, see "Safety" on page 88.

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Getting Started

For detailed information, see *Chapter 2, Getting Started* in the **Vivid 3 User's Manual**.

Front and Side View

1. **Display Monitor**
   Swivels to the left and right, and tilts up and down.
   - 15" Monitor
   - 17" Monitor
2. **Speakers**
3. **Alphanumeric Keyboard**
4. **On/Off Switch**
5. **General Storage Areas**
   Situated on either side of the front panel on the top surface, on either side of the monitor.
6. **Probe Holders and Gel Holders**
   Situated on either side of the front panel. The closest holder to the monitor on each side is for storing bottles of gel.
7. **Control Panel**
   Contains all the buttons and the alphanumeric keyboard used to operate the ultrasound unit.
8. **Front Handles with Raise/Lower Grip Lever**
   The grip lever located midway beneath the front handles enables the user to raise or lower the front panel and monitor.
9. **Probe Ports**

   Either:
   - Two active probe ports, one park probe port and one pencil probe port.

   Or:
   - Three active probe ports and one pencil probe port.
10. **Foot Brake**
    Three-position brake. LEFT locks the wheels, MIDDLE unlocks the wheels, and RIGHT locks the swivel action.
11. **Footswitch (Not Shown)**
    Configurable footswitch that enables certain keyboard commands to be operated by foot.
12. **Side Bay**
    The color printer or JVC VCR is contained in the upper-left side bay of the unit.
13. **Peripherals Storage Area**
    All VCR recorders (excluding JVC VCRs) and black & white printer are positioned on the peripheral storage area under the front panel.
14. **Cable Hook**

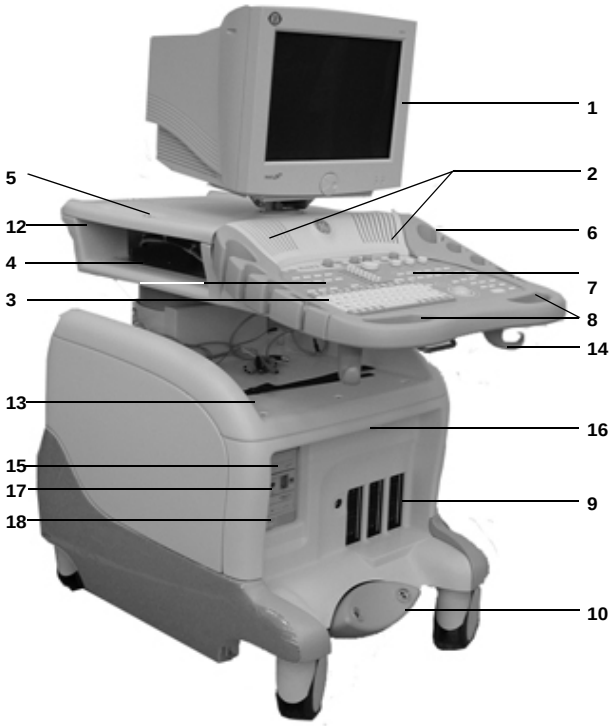


Figure 1: Front View

15. **Floppy/MO Disk (optional)/CD-R Drive**
16. **Air Filter Vent**
17. **ECG Cable (Internal/External) Phono Connections**
18. **Footswitch Connection**

Rear View

1. Monitor cables, video and power cables
2. Power cable storage hook
3. Circuit breaker On/Off switch
4. Ground Screw
5. Main power cable socket

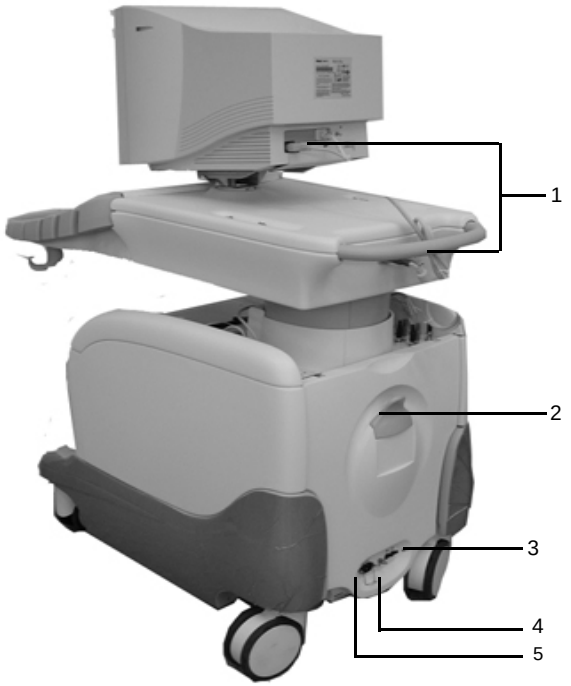


Figure 2: Rear View

Warnings

All the warnings in *Chapter 16, Safety* of the **Vivid 3 User's Manual**, should be read and understood before operating the **System.**

Never set liquids on the unit. Maintain a clean environment to prevent spillage into the unit or control panel, Turn off the circuit breaker before cleaning the unit. Refer to *Chapter 15, User Maintenance* in the **Vivid 3 User's Manual** for cleaning instructions and regular preventative maintenance procedures.

Service representatives authorized by GE will unpack and install the unit. Do not attempt to install the unit without the service representative.

Operating the unit with the wrong voltage range will cause damage and void the factory warranty.

Only qualified physicians or ultrasound sonographers should perform scans of patients for medical diagnostic reasons. Request training, if needed. Ensure that unauthorized personnel do not tamper with the unit.

Preparing the Unit for Use

The System must operate within the proper environment and in accordance with the requirements described in this section. Before using the unit, ensure that all these requirements are met.

Site Requirements

The following site requirements are necessary for the System to function optimally

Power Requirements

The System requires a separate power outlet with at least a 12 amp circuit breaker for 100-120 VAC (Japan/USA) or at least a 6 amp circuit breaker for 220/230/240 VAC (Australia/Africa/Europe/Latin America).

Operating Environment

Ensure that there is sufficient air flow around the **System.**

DO **NOT** install the unit in a location where the display screen is exposed to direct light. Reflections on the screen make it difficult to view images.

Environmental Requirements

The operational environment of the System requires constant maintenance. Different temperature and humidity ranges are specified in the table below:

Requirement	Temperature	Humidity	Air Pressure
Operational	10 to 50^{o}C 50 to 122^{o}F	50-70%	700-1060 hPa
Storage	-20 to 60^{o}C -4 to 140^{o}F	10-95%	700-1060 hPa
Transport	-20 to 60^{o}C -4 to 140^{o}F	10-95%	700-1060 hPa

Electromagnetic Interference

To protect the System from electromagnetic interference:

- Operate the unit at least 4.6 m (15 feet) away from equipment that emits strong electromagnetic radiation.
- Operate the unit in an area enclosed by walls, floors and ceilings comprised of wood, plaster or concrete, which help prevent electromagnetic interference.
- Shield the unit when operating it in the vicinity of radio broadcast equipment.

NOTE: The System is approved for use in hospitals, clinics and other environmentally qualified facilities, in terms of the prevention of radio wave interference. Operation of the unit in an inappropriate environment can cause electronic interference to radios and television sets situated near the medical equipment.

Connecting the Unit

Before connecting the System, perform preliminary checks of the power cord, voltage level, and compliance with electrical safety requirements. Use only the power supply cords, cables, and plugs provided by, or designated by, GE Medical Systems. Extension cords must not be used. Ensure that the power cord and plug are intact and that the power plug is the proper hospital-grade type.

NOTE: A GE-qualified person should perform the initial system installation.

Products equipped with a power source plug should be connected to the fixed power socket which has the protective grounding conductor. Never use any adapter or converter to connect with a power source plug (for example, three-prong to two-prong converter).

Failure to provide an adequate ground circuit can cause electrical shock, resulting in serious injury.

Voltage Level Checks

Before connecting the System to the power source, perform the following voltage level checks:

1. Check the label near the mains input connector. A yellow label indicates the input connector is either 100 V, 120 V, 220 – 240 V.
2. Check the voltage indicated on the label:

- 100 V 50 – 60 Hz 8A
- 120 V 50 – 60 Hz 18A
- 220 – 240 V 50 – 60 Hz 4A

Maximum power requirement = 1.2 KVa
Maximum allowed voltage deviation = ± 10

If the mains supply is not within the specified range, **DO NOT CONNECT THE UNIT TO THE POWER SOURCE**. Contact the dealer to have the unit adjusted for the specific mains supply.

Electrical Safety Requirements

Ensure that all equipment connected to the System complies with national safety requirements for medical equipment. These safety requirements include: IEC60601-1, CSA22.2, AS3200.1, and UL 2601-1.

Connecting to the Electrical Outlet

Before connecting the System to the electrical outlet, ensure that the wall outlet is of the appropriate type, and that the power switch is turned off.

NOTE: To assure grounding reliability, connect to a "hospital grade" or "hospital only" grounded power outlet.

To connect the unit to the electrical outlet:

1. Uncoil the power cable, allowing sufficient slack so the plug will not pull out of the power socket if the unit is moved slightly.
2. Secure the power plug in the mains power socket.

The unit's power must be supplied from a separate, properly rated outlet to avoid the risk of fire. Refer to the *Power Requirements* section in *Chapter 2* of the **Vivid 3 User's Manual** for rating information. The power plug should not, under any circumstances, be altered to a configuration rated less than that specified for the current. **DO NOT** use an extension cord or adapter plug.

Connecting the Peripherals

The peripheral connectors are located under covers on the top rear of the unit, beneath the monitor. The basic peripheral setup is performed by the service representative when the unit is installed. For details regarding connecting peripherals, refer to *Chapter 12, Peripherals* in the **Vivid 3 User's Manual**.

NOTE: To access the rear panel connectors, unscrew the two screws on the top of the rear panel, then lift the cover.

NOTE: For JVC CVRs, the cable connectors are in the side bay.

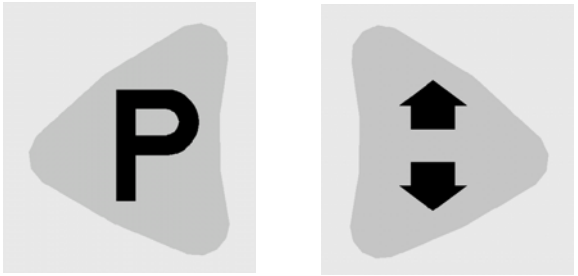
Connecting the Footswitch

Connect the System's triple footswitch to the FOOTSWITCH input on the left side of the front panel. Each of the footswitch pedals may be assigned to correspond with the various control panel functions. For detailed information, refer to *Chapter 14, Presets and System Setup* in the **Vivid 3 User's Manual**.

Wheels

Wheel Position	Characteristics
Front	Swivel, swivel lock, and full lock.
Rear	Swivel, but do not lock.

Pedal



Pedal Position	Function
Left	Locks wheels.
Middle	Wheels completely free.
Right	Locked front swivel.

To engage in full lock (brake):

- Press the left side of the pedal.

To release the brake:

- Press the left or right side of the pedal to return it to the middle position.

To engage front swivel lock:

- Press the right side of the pedal.

To release front swivel lock:

- Press the left side of the pedal to return it to the middle position.

Switching On the Unit

1. Insert the plug into the mains power socket.
2. Set the circuit breaker to ON. The **On/Off** switch text label and green LED light are lit.
3. Hold down **On/Off** for a few seconds. The **On/Off** switch text label will switch off, (the green LED remains lit) and a click will be heard.

Switching Off the Unit

Standby Mode

Standby Mode ensures that the next time the system is switched on, it will be ready for scanning in less than 30 seconds. In order for the system to remain in Standby Mode, it **MUST** remain connected to the electrical outlet at all times. If the unit is disconnected from the electrical outlet, it will undergo complete shutdown and require regular bootup time, unless the Plug&Scan (UPS) option is installed.

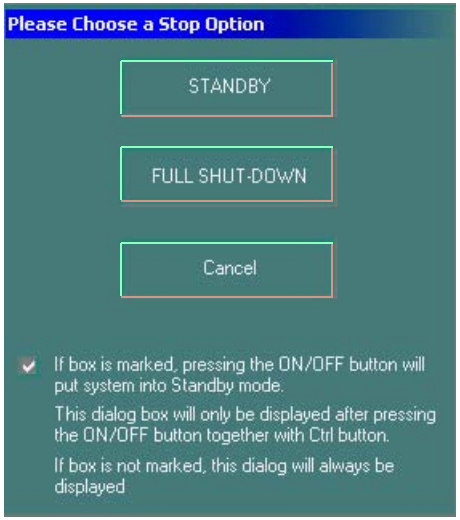
To initialize Standby Mode:

1. Simultaneously press **<Ctrl>** and hold down **On/Off** until the **Shut Down** screen is displayed.
2. TRACKBALL to **Standby** and press **Select**. The system enters Standby Mode, indicated by the **On/Off** button text blinking.

Full Shutdown

To initialize Full Shutdown:

1. Simultaneously press **<Ctrl>** and hold down **On/Off** for three seconds. The following screen is displayed:


Please Choose a Stop Option
STANDBY
FULL SHUT-DOWN
Cancel
If box is marked, pressing the ON/OFF button will put system into Standby mode.
This dialog box will only be displayed after pressing the ON/OFF button together with Ctrl button.
If box is not marked, this dialog will always be displayed

NOTE: This screen is displayed whenever holding down the On/Off button continuously for more than 3 seconds.

2. TRACKBALL to **Full Shutdown** and press **Select**. The system performs a complete shutdown.

Plug&Scan (UPS) Option

If this option is installed, the unit can be disconnected from the electrical outlet while in Standby Mode for about one hour without the system initializing a Full Shutdown.

This enables the user to transport the system and be assured that the unit, when switched on, will be ready for scanning in less than 30 seconds.

NOTE: When the system is powered by the Plug&Scan option in Standby Mode, the On/Off button will blink.

Connecting and Disconnecting Probes

- The **Vivid 3** ultrasound unit has the following probe ports:

  Either:

  - Two active probe ports, one park probe port and one pencil probe port.

  Or:

  - Three active probe ports and one pencil probe port.

To connect probes:

1. Inspect the probe socket to verify that it is free from debris.
2. Hold the rectangular probe connector vertically so that the probe's cable points upwards.
3. Set the lock to the **OPEN** (horizontal) position.
4. Gently insert the connector into one of the matching sockets on the lower control panel of the unit. Push the connector in as far as possible.
5. Rotate the locking latch 90 degrees clockwise to lock the connector into place.

To display the Select Probe and Application screen:

- Press **Probe**.
  The *Select Probe and Application* screen is displayed. Refer to *Chapter 13, Probes* in the **Vivid 3 User's Manual** for further information.

To disconnect probes:

1. Rotate the lock 90 degrees counterclockwise, releasing it from its lock position.
2. Remove the connector from the probe socket.

Handle the probes gently while connecting and disconnecting them.

Transportation and Positioning

To avoid damaging the unit and ensure maximum safety while moving the unit, follow the precautions below.

NOTE: If the Plug&Scan option is being used, the procedures for temporarily moving the unit short distances differ from those for preparing the unit for long distance transportation and storage.

Moving Precautions

To prepare the unit to be moved temporarily (Plug&Scan installed):

1. Initialize Standby Mode. The **On/Off** button text will blink.
   NOTE: If battery is fully charged, the System will remain in Standby Mode for approximately one hour.
2. Remove the plug from the mains power socket.
3. Disconnect all cables linking the unit to any off-board peripheral devices, such as a computer network. Note the marks on each cable to reconnect them later.
4. Secure and loop the power cord counterclockwise around the hook on the unit's rear panel.

DO NOT tuck the power cord under the area where it is attached to the console. This could loosen the connection.

5. Place all probes in the probe holders and ensure that the probe cables do not protrude from the unit or interfere with the wheels. Store all other probes in their original cases, soft cloth or foam, to prevent damage.

Important: Before moving to a new site, remove all the probes and pack them in their original cases, soft cloth or foam, to prevent damage.

6. Ensure that no loose items are left on the unit. All loose items (such as: gel, ECG cables, CDs and optical disks), should be stored in the unit pockets.
7. Unlock the brake by pressing down on the pedal to return it to its middle position.

To prepare the unit to be moved (Plug&Scan not installed) or for long term storage or long distance transportation:

1. Initialize a Full Shutdown, as described in the *Full Shutdown* section in *Chapter 2, Getting Started* in the **Vivid 3 User's Manual**.
2. Set the circuit breaker to OFF.
3. Remove the plug from the mains power socket.
4. Follow steps 3 – 7 of the previous procedure.

To ensure safety while moving the unit on foot:

- Proceed cautiously when crossing door or elevator thresholds.
- Grasp the front handle grips or the back handle bar and push or pull. **DO NOT** attempt to move the unit using cables or probe connectors. Take extra care while moving the unit long distances and on inclines.
- Ensure that the unit does not strike walls or door frames.
- Ensure that the pathway is clear.
- Move the unit slowly and carefully.
- Know where the foot brake is located and learn how to use it. The foot brake must be set when moving of the unit stops.
- One adult can usually move the unit along a level surface for short distances. Use two or more persons to move the unit on inclines or over long distances.

Avoid inclines that are steeper than 10 degrees, or bumps higher than 2.5 cm (1 in), to prevent the unit from tipping over. After reaching the destination, lock the front wheel brake.

Transporting the Unit

Take extra care when transporting the unit by vehicle. In addition to following the moving precautions listed above, make sure to follow the safety precautions below.

Important: Save and reuse the original packaging if moving the unit to other sites. GE service representatives or their assignees should perform the move. A specially designed van should also be used.

To ensure safety while transporting the unit by vehicle:

1. Disconnect all probes and secure them in their boxes.
2. Use the control panel release handle, situated under the center front of the control panel, to lower the control panel to its minimum height.
3. Ensure that all peripherals are secured.
4. Ensure that the transporting vehicle is appropriate for the unit's weight. The recommended load capacity is a minimum of 160 - 168 kg (353 - 370 lbs). The vehicle should have good shock absorbers and a door large enough for the unit with its monitor and any peripherals to clear.
5. Park the vehicle on a level surface for loading and unloading.
6. Secure the unit while it is on the lift, to prevent rolling. Do not attempt to hold it in place by hand. Cushion the unit and strap the lower part so that it does not break loose.

Ensure that the lift can handle a minimum of 360 kg (794 lb), although a capacity of 400 kg (882 lb) is preferable. **DO NOT** remain on the lift with the unit.

7. Load the unit into the van very carefully, ensuring that it remains over its center of gravity.
8. Ensure that the unit is secured inside the vehicle, keeping it still and upright, yet not damaging the control panel. Secure it with straps to prevent movement while in transit.

DO NOT attempt to hold the unit in place by hand.

9. Drive cautiously to prevent vibration damage. Avoid unpaved roads, excessive speeds, and erratic stops and starts.

Reinstalling at a New Location

Lock the wheel brake when the unit is installed at a new location. Follow the installation procedures described in *Chapter 2, Getting Started* in the **Vivid 3 User's Manual**.

Unit Acclimation Time

Following transport, the unit may be very cold or hot. Allow the unit to acclimate before being switched on. Acclimation will take one hour for each 2.5^{o}C increment when the unit's temperature is below 10^{o}C or above 35^{o} C.

^{o}C	0	2.5	5	7.5	10	35	40	42.5	45	47.5	50	52.5
^{o}F	32	36.5	41	45.5	50	95	104	108.5	113	117.5	122	126.5
Hours	4	3	2	1	0	0	2	3	4	5	6	7

^{o}C	55	57.5	60
^{o}F	131	135.5	140
Hours	8	9	10

Adjusting the Display Monitor

NOTE: When the monitor is adjusted correctly, a faint "Vivid" watermark is displayed in the lower portion of the screen. If this is not seen, adjust the brightness (as described below) until the watermark is just visible.

Vivid 3 15" Monitor Adjustment

To adjust the contrast or brightness of the display monitor:

1. With the display monitor menu turned off, press the button (to adjust contrast) or the button (to adjust brightness) on the front of the monitor.
2. Press the **+** or **–** buttons on the front of the monitor to decrease or increase the selection value.
3. Press **Exit** twice to close the on-screen menu.

Vivid 3 Expert Monitor Adjustment

NOTE: Applies to older-type monitors only. See below for new-type 17" monitors.

To adjust the contrast or brightness of the display monitor:

1. Press the **JAG** control dial found in the bottom- center of the lower monitor frame casing. The **Main** menu is displayed.
2. Rotate the JAG dial to highlight either the or the icon.
3. Press the **JAG** control dial to select and activate the required function. A control screen is displayed.
4. Rotate the **JAG** control dial to adjust the settings as required, then press the **JAG** control Dial to exit the control screen. The **Main** menu is redisplayed.
5. Rotate the JAG control dial to highlight **Exit**, then press the **JAG** control dial to exit the main menu. The scanning screen is redisplayed.

Vivid 3 17" Monitor Adjustment

To adjust the contrast or brightness of the display monitor:

1. Press the center panel (below the screen); the panel flap opens exposing the controls:

2. Use the *Up* and *Down* arrows to adjust the brightness, as required.
3. Use the *Left* and *Right* arrows to adjust the contrast, as required.
4. Use the button on the *Right* for advanced adjustments.
5. When all required adjustments performed, press the button on the *Left* to exit.

Control Panel: Button Illumination

The flat buttons on the System's control panel are labeled. Only the buttons that are available for use in the current mode and/or application are illuminated.

- **Active** selections that are toggled on have the green light on the button lit.
- **Enabled** selections have the button label illumination lit.
- **Disabled** selections have the button label illumination turned off.

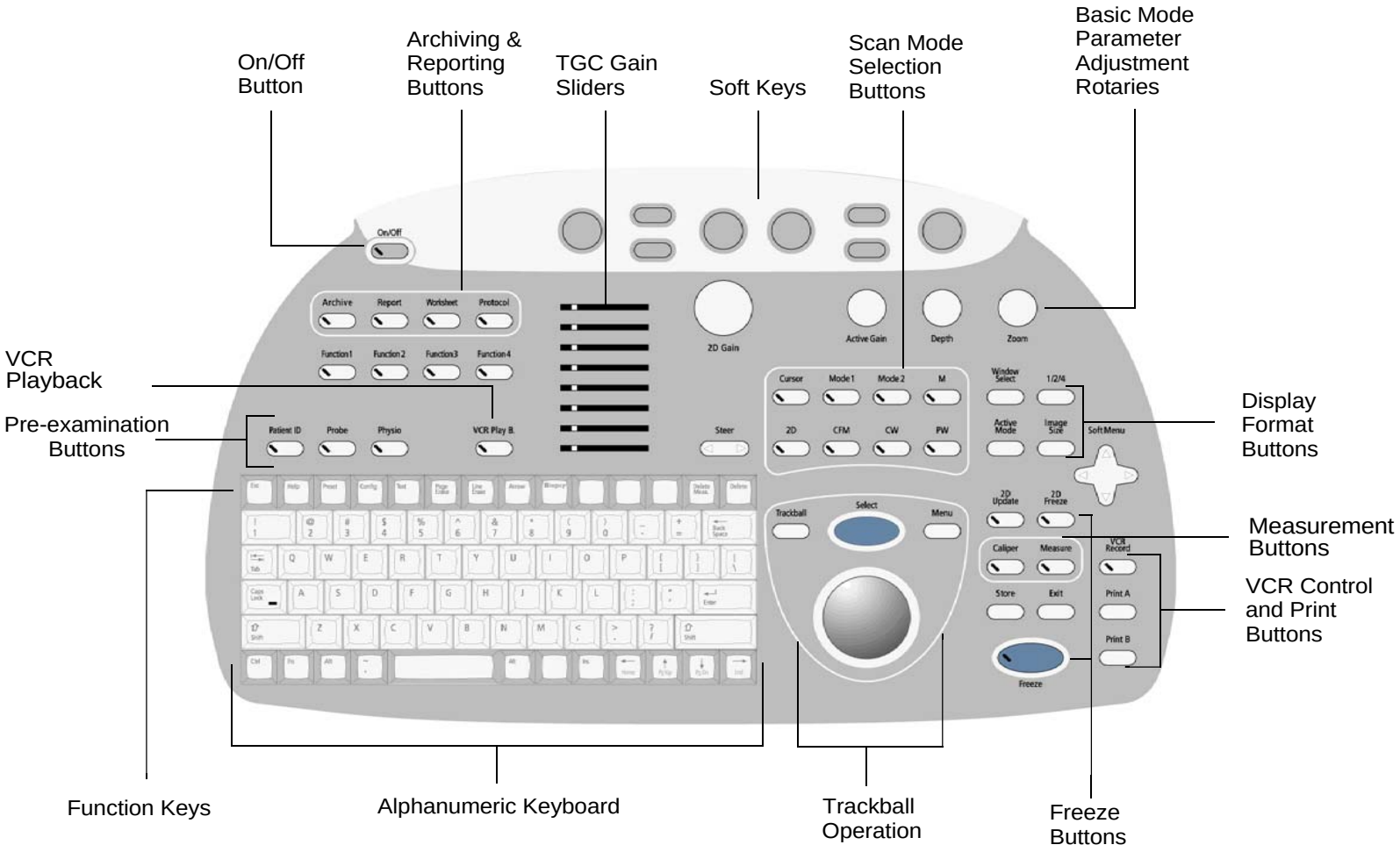


Figure 3: Control Panel Layout Diagram

NOTE: For details on Soft Keys and Soft Menu Rocker functions, see "Soft Key and Soft Menu Functions" on page 21.

Beginning an Examination

Entering Patient Details

To access patient information:

- Press **Patient ID**, **Date of Birth**, or **Last Name**.

Important: The layout of the Patient List screen is dependent on the screen layout template selected during system configuration. For details, refer to *Chapter 14, Presets* in the **Vivid 3 User's Manual**.

NOTE: The screen layout is displayed in accordance with the currently-selected Patient ID Page Type. (For details, refer to Vivid 3 Pro/Expert SW 2.2 Release Notes). Any one of the following four types may have been be selected:

- **Type A**:Full details - includes Patient ID, Weight and Height
- **Type B**:No Patient ID - includes Last Name, DOB, Weight and Height
- **Type C**:Patient ID on 2nd line; No Weight or Height
- **Type D**:No Patient ID; No Weight or Height

To enter a new patient:

1. Press **Patient ID**.
2. TRACKBALL to **Start New Patient** in the *Select* screen and press **Select**. The *Main Details* screen is displayed.

Important: Either an **ID Number** or **Last Name** is mandatory. All other patient details are optional.

3. TRACKBALL to the **Patient ID** or **Last Name** field and press **Select**.
4. Enter the patient's ID number or last name.
5. Enter additional patient details in the remaining fields, using **<Tab>** or **<Enter>,** navigate to each field,
6. Use the **Select Page** soft key rotary to navigate through the data entry pages. Add patient details as required.
7. Press the **Begin Exam** soft key.

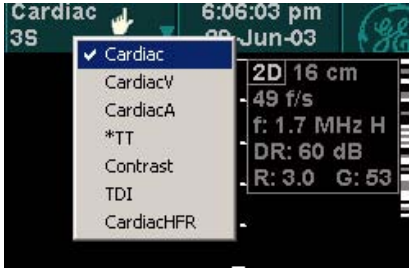
To select a probe and an application:

1. Press **Probe**.
2. TRACKBALL to the required application preset in the frame of the appropriate probe and press **Select**. The name of the currently selected probe and application are displayed in the information bar at the top of the 2D screen. The examination can now begin.

To select a preset from the top of the image screen:

NOTE: A green triangle is located at the top of the Image screen alongside the name of the currently-selected preset. Clicking on the triangle opens a pull-down menu in which all presets available for the currently-selected probe are listed.

*NOTE: On the image screen, when the cursor is in the area around the preset name or the green triangle, the cursor changes to a hand-shaped pointer. Clicking **Select** opens a drop-down menu; a checkmark is visible preceding the name of the currently-active preset (Cardiac in the example shown below):*



1. Click the triangle at the top of the image screen (on the right of the currently-selected preset name).
2. From the pull-down menu, trackball to the required preset and press **Select**.

   The pull-down menu closes and the name of the newly-selected preset is displayed at the top of the screen.

NOTE: The names listed in the pull-down menu are relative to the currently-selected main application. User-modified preset names are preceeded by an asterisk (*).

Scanning Screen Layout

The scanning screen is divided into several areas, as shown in Figure 4:

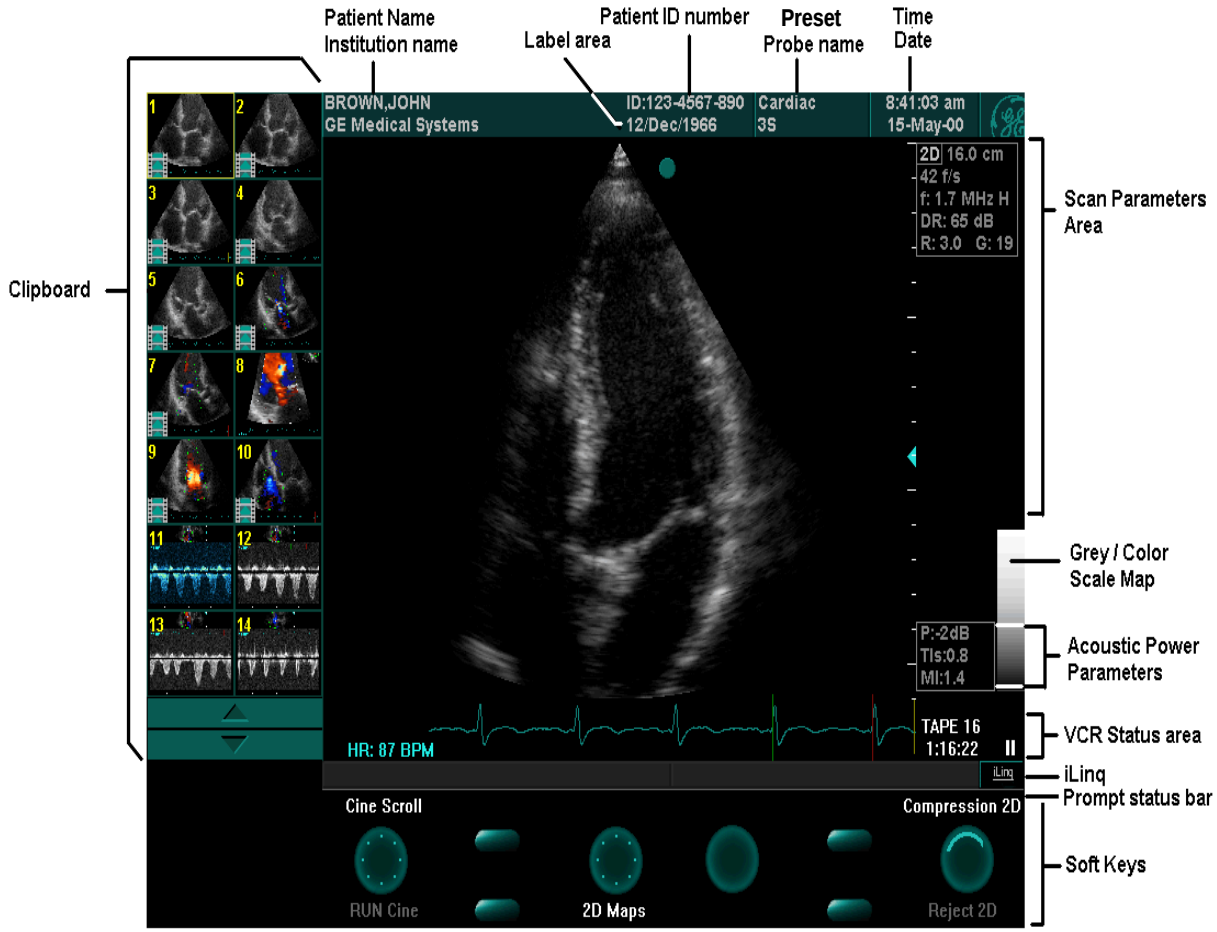


Figure 4: Scanning Screen

Basic Scanning Operations

The System enables the user to perform various supplementary operations to improve both the examination process and quality of the data archived for future use.

For detailed information regarding scanning mode functions, refer to *Chapter 3, Modes* in the **Vivid 3 User's Manual**.

Storing Images and Cineloops

Images and cineloops can be stored at any time during the scanning session, by using the **Store** soft key.

NOTE: The Store soft key should be pressed twice. The first time to preview the image, the second to accept and store the image.

For further information, refer to *Chapter 10, Patient Management* in the **Vivid 3 User's Manual**.

Storing Images on VCR

Images can be recorded on a video tape. Press **VCR Record** to start recording. For detailed information regarding the VCR recorder, refer to *Chapter 12*, *Peripherals* in the **Vivid 3 User's Manual**.

Text Annotations

To insert a text annotation:

1. Press **<Text>**. A text cursor (I) is displayed in the upper-left corner of the display screen, or in the user-defined home position.
2. TRACKBALL the text cursor to the position at which text is to be inserted.
3. Use the alphanumeric keyboard to type the required text. To add additional annotations, press **Menu**.

To move a line of text:

If required, a line of text may be moved (*up*/*down*/*left*/*right*)

1. Trackball to the line and press **Select**.
2. W*hile holding down the **Select** button on the control console*, drag the selected line of text to the required position, using the trackball.
3. Release the Select button. The line of text will remain fixed in the new position.

Deleting Text Annotations

To delete a specific text annotation from the screen:

1. TRACKBALL to the annotation to be deleted and press **Select** to highlight.
2. Press **<Line Erase>**. The selected annotation is erased.

NOTE: If you did not select the annotation (Step 1), the last line typed will be erased.

To erase all the annotations from the screen:

- Press **<Page Erase>**.

Depth Adjustment

To adjust the image depth:

- Rotate the **Depth** rotary.

Zoom

Magnifies the display in both frozen and live 2D, M-Mode and combined mode images.

To zoom an image:

1. Rotate the z**oom** rotary to magnify the image.
2. Press the **Zoom** rotary to toggle between the actual-sized image and the magnified image.

Performing Measurements

To perform measurements:

- Press **Caliper** or **Measurement**. See *Chapter 6, Cardiac Measurement and Analysis* and Chapter 7, Vascular Measurement and Analysis in the User's Manual for details.

Modes

For additional information, see *Chapter 3, Modes* in the **Vivid 3 User's Manual**.

2D-Mode Imaging

Accessing 2D-Mode

To access 2D-Mode:

- Press **2D**.

Adjusting the Gain in a 2D Image

Use the **2D Gain** rotary to adjust the overall gain on both live and frozen images, as well as on images retrieved from the image archive.

Using Zoom in 2D-Mode

To enlarge the zoom factor:

- Rotate the **Zoom** rotary clockwise. The ROI (Region of Interest) border reduces in size, producing a greater enlargement (zoom factor) of the reduced area.

To reduce the zoom factor:

- Rotate the **Zoom** rotary counterclockwise. The ROI border increases in size, producing a smaller enlargement (zoom factor) of the larger area. Continued counterclockwise rotation reaches a point at which the zoom is automatically switched off and the reference image is no longer displayed.

To exit the zoom function:

- Press the **Zoom** rotary once after the ROI has been sized and positioned as required.

Working with Cineloops

To manually select a heartbeat:

1. While in any scanning mode, press **Freeze**. The scan mode freezes and the First Marker and End Marker are displayed on either side of the last detected heartbeat on the ECG trace.
2. Press the **Cine Scroll** soft key rotary to start the cineloop playback.
3. Use the **Previous/Next** soft key rotary to select the heart cycle to be played back.
4. Use the **First Marker** and/or **End Marker** soft key rotaries to trim or expand the cineloop boundaries.

*NOTE: By default, one cycle is stored in one cine. However, up to 8 cycles may be stored. Select the required number of cycles, using the **Cycles for Store** soft key:*

To adjust the frame rate:

- Rotate the **Cine Speed** soft key rotary to adjust the frame-rate of the cineloop.
  The default is *Nominal* speed.

To view a cineloop frame by frame:

1. Press **Stop Cine**.
2. Use the **Cine Scroll** soft key rotary.

Working in Split Screen Mode

To split the screen:

- Press **1/2/4** once to split the screen into two windows.
- Press the button again to split the screen into four windows
- Press the button a third time to revert to a single image display.

To toggle between windows:

- Press **Window Select.** The active window is marked with a solid light-blue circle near the top of the image and a yellow frame. Non-active windows are marked with a hollow circle near the top of the image and no frame.

To enlarge the display area:

- Press **Image Size**. The images will increase in size, and the parameter display column will not be displayed.

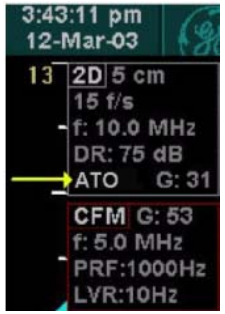
Automatic Tissue Optimization (ATO)

When enabled, Automatic Tissue Optimization (ATO) results in automatic optimization of 2D imaging. This feature is based on the ability of the system to "inspect" the actual image on the screen and - based on image content - make adjustments in real-time, in order to optimize the 2D image.

To activate the ATO function:

1. Press the **2D Gain** button on the control console.

   On the scanning screen, the letters ATO will be displayed, indicating that the ATO option is operative, as shown below:



NOTE: When ATO is active, the Reject function is disabled.

2. Press the **2D Gain** button again at any stage, to turn the ATO option OFF.

NOTE: The system samples the scanning image only upon the instant of ATO activation. If the scan position or conditions have changed after ATO has been activated, it is advisable to toggle ATO OFF and then ON again, in order for the system to sample the most current image.

CFM-Mode Imaging

Accessing CFM-Mode

To perform a CFM-Mode scan:

1. Press **CFM**.
2. Adjust the ROI as required:

- Move the TRACKBALL left or right to adjust the position of the ROI.
- To change the size of the ROI, press the **ROI Size** soft key,
- Move the TRACKBALL up and down to lengthen or shorten the ROI.

Adjusting the CFM-Mode Image

If the 2D image must be adjusted, and the necessary soft key control is not displayed, press **Active Mode** to toggle between the different soft key menus.

Color Gain

While in color, the **Active Gain** rotary controls the color gain. The **2D Gain** rotary remains active to control the gain of the 2D portion of the image.

Using Zoom in CFM-Mode

The zoom function is performed the same as that for 2D-Mode. However, the TRACKBALL controls the Color ROI position together with zoom panning.

Exiting CFM-Mode

To exit CFM-Mode:

- Press **CFM**. A 2D image is displayed.

M-Mode Imaging

Accessing M-Mode

To perform an M-Mode scan:

1. Begin a scan in 2D-Mode.
2. Press **M**.
3. Use the TRACKBALL to position the M cursor over the required anatomy.
4. Press **M** again to start the M-Mode sweep.

Adjusting Total Gain

The **Active Gain** rotary enables the overall gain of the M-Mode portion of the image without affecting the overall gain of the 2D portion of the image.

The **2D** rotary enables the overall gain of both the M-Mode image and the 2D-Mode image to be adjusted simultaneously.

Adjusting the 2D Image in M-Mode

If the 2D image must be adjusted, and the necessary soft key control is not displayed, press **Active Mode** to toggle between the different soft key menus.

Using Zoom in M-Mode

The M scroll portion of the display will expand by the same zoom factor to correspond with the 2D image. When the zoom ROI border is panned with the TRACKBALL, the effect on the M scroll is equal to that on the 2D image.

NOTE: Unlike in 2D-Mode, no zoom reference image appears in this mode.

Resizing/Repositioning the M-Mode Display

To resize and/or reposition the image display:

1. Press the **Image Size** soft key to toggle between the M scroll sizes: either half, two thirds, or full display.
2. Press **Layout** to toggle between a top/bottom or side-by-side split screen display.

Enlarging the 2D Image

To display a full-sized 2D image:

1. In M-Mode, press **Freeze**. The M-Mode display is frozen.
2. Press **M.** The M scroll will temporarily disappear, displaying a full-sized 2D image.
3. Press **M** again to re-display the original M-Mode layout.

Exiting M-Mode

To exit M-Mode:

- Press **M**. The image reverts to 2D-Mode. The M cursor remains on the image; pressing **M** again will re-enter M-Mode.

To access Anatomical M-Mode:

1. Perform a 2D-Mode scan and press **Freeze**.
2. Press **M** to generate the Anatomical M-Mode sweep.

To position the M cursor:

1. Rotate the **Line Move** soft key rotary clockwise to move the M Cursor to the right.
2. Rotate the **Line Rotate** soft key rotary clockwise to rotate the M cursor to the right.

Doppler Mode Imaging

Regular Doppler Display

To access PW Doppler Mode or CW Doppler Mode:

1. Perform a 2D-Mode scan.
2. Press either **PW** or **CW**. The Doppler cursor (and the Doppler gate, when in PW Doppler Mode) is displayed on the image.
3. Use the TRACKBALL to position the Doppler cursor (and Doppler gate, when using PW-Mode) over the appropriate anatomy.
4. When positioned, press **PW** or **CW** to run the PW or CW spectrum.
5. While the spectrum is scrolling, use the TRACKBALL to reposition the Doppler cursor and/or gate position.
6. Press **Select** or **2D Update** to freeze the Doppler spectrum and update the 2D image.

Duplex Doppler Display

To access PW Doppler Mode or CW Doppler Mode:

1. Follow steps 1 – 4 above.
2. Press one of the arrows on the **Soft Menu Rocker.** A pop-up menu is displayed on the screen.
3. Use the vertical arrows to highlight the **Enable Triplex** option from the soft menu.
4. Use the left or right arrows to change the status to **1** (enabled). The display changes to Duplex Doppler, and both the 2D image and Doppler Spectrum are active.
5. While the spectrum is scrolling, use the TRACKBALL to reposition the Doppler cursor and/or gate position.
6. Press **Active Image** to toggle between the active soft key menus.
7. Press **Select** or **2D** to freeze the Doppler spectrum. Then press **2D Update** to update the 2D image.

To access PW Doppler Mode or CW Doppler Mode (Triplex Doppler display):

1. Perform a 2D-Mode scan.
2. Press either **PW** or **CW** on the control panel. The Doppler cursor (and the Doppler gate, when in PW Doppler Mode) is displayed on the image.
3. Use the TRACKBALL to position the Doppler cursor (and Doppler gate when in PW-Mode) over the appropriate anatomy.
4. Once positioned, press **PW** to run the PW spectrum.

NOTE: Only in specific velocities will Interleave Triplex be activated automatically.

5. While the spectrum is scrolling, use the TRACKBALL to reposition the Doppler cursor and/or gate position.
6. Press **Active Mode** to toggle between the active soft key menus.
7. Press **Select** or **2D** to freeze the Doppler spectrum, then press **2D Update** to update the 2D image.
8. Press **2D Freeze** to freeze the 2D display, if required.

Adjusting the Gain in Doppler Mode

In both CW Doppler and PW Doppler Modes, the **Active Gain** rotary enables the overall spectral gain to be adjusted in either active or freeze modes and on images retrieved from the image archive.

The **2D Gain** rotary enables the overall gain of the 2D image to be adjusted, without affecting the Doppler spectrum.

Enlarging the 2D Image

To temporarily hide Doppler display:

1. With PW/CW image frozen, press **PW** or **CW**. A full-sized 2D image is displayed.
2. Press **PW** or **CW** again to re-display original Doppler layout.

Steering on Vascular Applications

To steer the Doppler interrogation beam:

1. Press **PW**.
2. Use the **Steer** rocker key to steer the Doppler interrogation beam to the right, left or perpendicular to the probe surface.
3. Use the **Doppler Angle** soft key rotary to align the Doppler angle cursor with the measured vessel.

To exit PW Doppler Mode or CW Doppler Mode:

1. If the system is in PW-Mode, press **PW.**
   OR
   If the system is in CW-Mode, press **CW.** Full 2D-Mode or CFM-Mode will be displayed.
2. Press **Cursor** on the control panel to hide the Doppler cursor.

LVO Imaging (optional)

Use the Left Ventricular Opacification Imaging (LVO Imaging) application to help identify LV thrombus and evaluate wall motion.

Support of LVO Imaging is an optional feature of the Vivid 3 system.

The LVO Imaging application is preset to:

- optimize resolution and enhance delineation of endocardial borders, and
- optimize assessment of wall motion and wall thickening.

WARNING: Read and carefully follow the manufacturer's instructions on the contrast agent's label.

Misdiagnosis Based on Image Artifacts

Misdiagnosis in ultrasound contrast images might be caused by several artifacts. These include:

- Motion artifacts
  Motion artifacts give rise to contrast-like signals independent of the presence of contrast. Motion artifacts may be caused by patient movement, including respiration, or by probe movement influenced by the operator.
- Regional drop-outs
  Regional drop-outs can be caused by the unintentional destruction of the contrast agent, too low a concentration of the contrast agent, poor acoustic penetration due to rib and/or lung shadows, or by the system failing to detect the contrast agent. The last cause might be the result of incorrect settings introduced by the operator.
- Tissue harmonics
  Tissue harmonics give rise to contrast-like signals independent of the presence of the contrast agent.

The LVO Imaging application default settings minimize the occurrences of artifacts. Nevertheless, the operator has to take these into account when analyzing the data and has to confirm the results using other techniques.

Optimizing LV Contrast

Usually, the default settings for the LVO Imaging application are the optimal settings. However, depending on the acoustic window of the patient or the specific contrast agent being used, there may be need for adjustment.

CAUTION: Too high a power setting will destroy the contrast agent in the LV cavity. **Destruction of the contrast agent is shown as a swirling pattern.**

If, before injection of the contrast agent, image quality is not acceptable, increase the power level. Then, when the contrast agent is observed in the left ventricle, reduce the power to a level giving homogenous opacification.

If a swirling pattern—that is, destruction of the contrast agent—is observed and persists after the LV cavity has been filled with the contrast agent, continue to reduce the power until homogenous opacification is obtained.

WARNING: Read and carefully follow the manufacturer's instructions on the contrast agent's label.

Angio™ Mode

Angio™ Mode (Power Doppler) is application dependent and is only used in vascular and shared services applications.

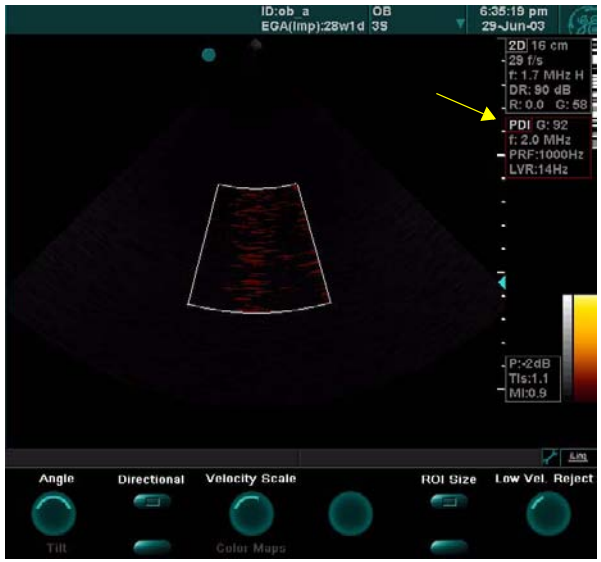
NOTE: Angio™ Mode is only available on selected probes and applications.

Accessing Angio™ Mode

To activate Angio™ Mode (Power Doppler):

- Press **Mode 2**.

  As shown in the example below, **PDI** (Power Doppler Image) parameters are displayed on the *right* of the screen, indicating that Power Doppler mode is currently activated:



Soft Key and Soft Menu Functions

The soft keys are unlabeled grey buttons and rotaries located at the top of the control panel.

A set of corresponding soft key icons is displayed at the bottom of the screen.

The functions of the soft keys vary according to the mode in which the user is working.

In each mode, a label above and/or below each soft key icon on the screen indicates the function of the corresponding soft key on the control panel, when pressed and/or turned. The lit (yellow) label indicates the currently active function.

For more detailed information, refer to *Chapter 3, Modes* in the **Vivid 3 User's Manual**.

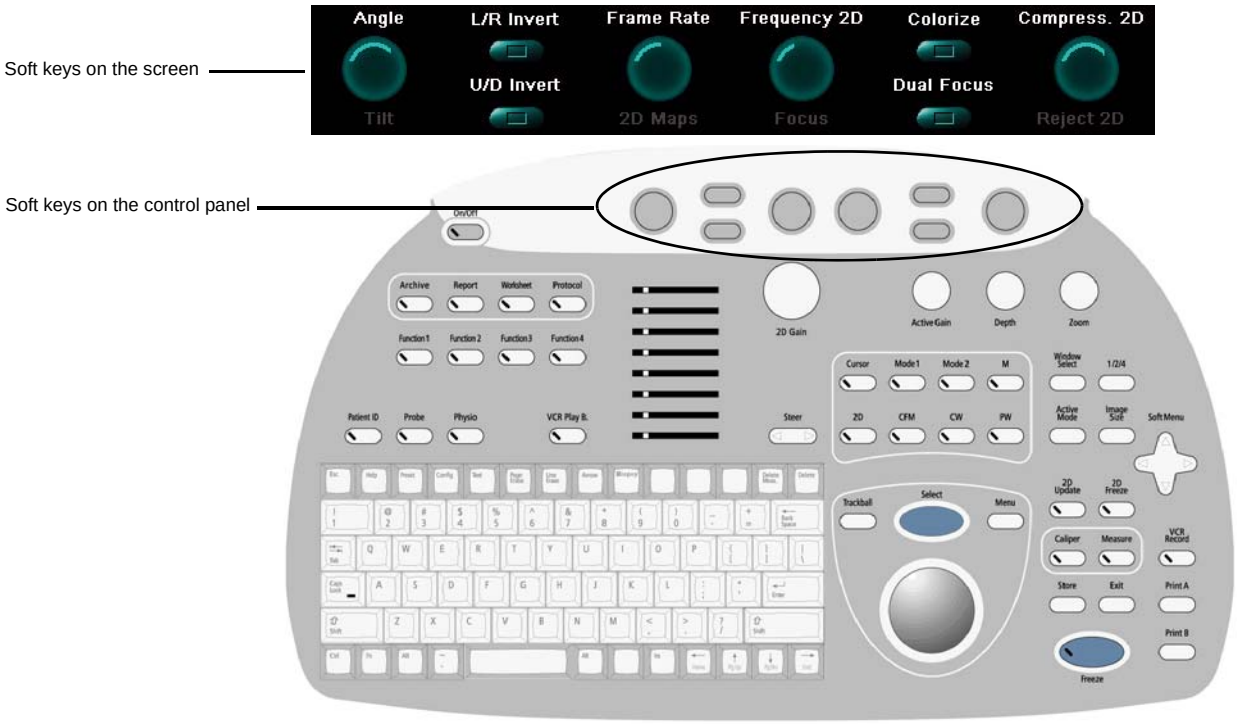


Figure 5: Soft Keys

The Soft Key functions are as follows:

- **%DR** – measures two diameters of one blood vessel (minimum and maximum).
- **%AR** – measures two areas of one blood vessel (minimum and maximum).
- **2D Maps** – displays a 2D Map menu. The menu enables an option from a list of non-linear grey-curves or different 2D-colorized curves to be selected.
- **2D Caliper** – measures distance on the 2D image.
- **2D Area** – measures area on the 2D image.
- **2D Volume** - measures volume of 2D area.
- **Angle** – controls the size or angular width of the 2D image sector (in degrees). A smaller angle generally produces a scan with a higher frame rate.
- **ECG Position** – the user can position the ECG according to preference.
- **Audio Volume** – enables the adjustment of the volume level in Doppler Mode.
- **Auto Update** – activates the 2D image for a short time whenever the gate is moved, allowing it to refresh for a short distance before the Doppler process is continued.
- **Baseline (color)** – modifies the color distribution map and changes the color contents of the image accordingly.
- **Baseline (Doppler)** – enables the Doppler spectrum to be shifted up and down.
- **B/C** - controls the priority of black & white image (B) vs. color (C).
- **Cine Scroll** – enables manual scrolling of the cineloop, in any of the modes, as an alternative to scrolling with the TRACKBALL.
- **Cine Speed** – controls the cineloop playback speed. When Nominal is displayed on the rotary on the screen, the loop is running at its original speed.
- **CO** – acquires two measurements; one on the Doppler trace and one on the 2D valve diameter.
- **Color Maps** – displays a menu of color map options. Rotate the rotary to select a color map.
- **Colorize** – enables the user to colorize black and white images. With the use of the 2D Maps soft key, the user selects the color map required.
- **Compression 2D** – increases compression when rotated clockwise, resulting in reduced contrast of the 2D image.
- **Cycles for Store** - enables the user to select the number of cycles to be stored in one cine.
- **Compression M** – increases the compression level and reduces the M-Mode image contrast when rotated clockwise, to soften the image. When rotated counter-clockwise, increases the M image contrast.
- **Contour M** – controls image processing related to the extent of edge enhancement applied to an image.
- **Curve** – activates Curved Anatomical M-Mode, enabling the user to generate a synthetic M-Mode display from a curved line drawn on a 2D image.
- **D Caliper** – measures maximum velocity, time, and slope on the spectral Doppler.
- **Directional** - shows direction of the Power Doppler (only in Angio [Power Doppler] Mode).
- **DDP Persistence** - enables adjustment of 2D image in time. The current frame retains some 2D information from previous frames, to prevent noise.
- **Doppler Angle** – enables the user to correct the Doppler velocity scale by defining the angle between the Doppler beam and the interrogated blood vessel (in degrees).
- **Doppler Maps** – displays a drop-down menu of different Doppler colorization/grey maps when rotated. Select the required non-linear grey curves or "colorized Doppler" curves.
- **Dual Focus** - provides another focal point in near field (only in Cardiac Mode).
- **ECG** - toggles between ON/OFF to show/hide ECG trace
- **ECG Internal/External** - enables the user to select the required signal source (either from the ECG cables connected to the system, or from an external ECG source.
- **ECG/Phono Gain** - controls the gain of the ECG/Phono signal.
- **End Marker** – moves the red vertical line that is displayed over the ECG trace to indicate the end of a cineloop. Move left or right to define the section of the cineloop that is to be displayed.
- **Envelope Adjustment** – corrects and adjusts the envelope for the Doppler spectrum image auto trace, assuring better accuracy.
- **First Marker** – moves the green vertical line that is displayed over the ECG trace to indicate the beginning of a cineloop. Move left or right to define the section of the cineloop that is to be displayed.
- **Focus** – changes the location of the focal zone marker by displaying a triangular focus marker that indicates the depth of the optimized focal point. In Color Mode, the focus location tracks the ROI position.
- **Foci Number** - enables the user to choose the required number of focal zone markers. The number of markers available for selection will depend upon the scanning depth of the scan currently in progress.

  NOTE:Changing the number of focal zone markers affects the Frame Rate.
- **Foci Position** - sets the position of the focal zone markers (relative to each other).

  NOTE:Toggles between Foci Number/Foci Position.
- **Foci Spread** - sets the spread of the focal zone markers. Turning the rotary to the *left* sets markers closer together; turning it to the *right*, set them further apart.
- **Frame Rate** – adjusts the frame rate (in frames/sec).
- **Frequency 2D** – enables adjustment of the transmit and receive operating frequency (in MHz).
- **Horizontal Sweep** – enables modification of the horizontal sweep speed (in m/sec).
  In PW-Mode: focus tracks the Doppler gate position.
  In CW-Mode: focus tracks the small horizontal marker located on the Doppler cursor.
  In M Mode: focus tracks time (in msecs)
  In ECG Mode:focus changes the trace speed.
- **HR** – measures heart rate.
- **Invert**
  - **Left/Right Invert:** Enables a mirror image of the 2D image to be created.
  - **Up/Down Invert:** Enables the 2D image to be rotated 180 degrees.
  - **Invert Color:** Enables the color scheme assigned to positive and negative velocities to be inverted.
  - **Invert (Doppler):** Enables the spectrum to be flipped 180 degrees, so that negative velocities are displayed above the baseline and positive velocities below the baseline. If the Doppler Mode is combined with Color Mode, the color map will also be inverted.
- **Layout** – enables toggling between side-by-side and top-bottom layouts when viewing two modes in parallel.
- **Line Move** – enables the M Cursor displayed over 2D images in Anatomical M-Mode to be moved from left to right across the scanning screen.

- **Line Rotate** – enables the M Cursor displayed over 2D images in Anatomical M-mode to be rotated 360 degrees.
- **Low PRF** – enables toggling between High and Low Pulse Repetition Frequency (PRF) functions, only in PW-Mode.
- **Low Vel. Reject (Color)** – enables the extent of low velocity removal to be adjusted (in cm/s).
- **Low Vel. Reject (Doppler)** – enables the low velocity portions of the spectrum to be filtered (in cm/s), since the Doppler spectrum and audio can contain strong, undesirable wall-motion signals.
- **LV** – measures left ventricle parameters (IVS, LVID, LVPW).
- **Manual Trace/Auto Trace** – enables Doppler signal envelope tracing.
- **M Caliper** – measures distance, time, and slope on the M-Mode display.
- **M Height** – measures distance on the M-Mode display.
- **M Maps** - displays a drop-down menu of different M-Mode grey or colorized maps.
- **Previous/Next** – enables the user to manually move to the *next* or *previous* heart cycle. Active when cineloop is running. (Toggles between Previous/Next cycles.)
- **PS + ED** – measures two velocity points on the spectral Doppler window.
- **Reject 2D** – enables 2D (grey) reject in CFM-Mode. Setting is differential to the value set in 2D only. Returning to 2D-Mode disables Reject 2D.
- **Reject M** – rejects the low-level echoes in the M-Mode image when rotated clockwise, producing a clearer image. Turn the rotary counterclockwise to decrease the low-level echo rejection.
- **Resize Results** – enables shortening and/or enlarging of the measurement result list shown in the window on the display screen.
- **ROI Size** – enables the TRACKBALL to control the dimensions of the color ROI (Region of Interest, when pressed. Use the TRACKBALL right, left, up, or down to control ROI height/width.
- **RUN Cine** – activates an endless playback of a cineloop when pressed. The time frame of the played back cineloop is defined by the colored markers displayed on the ECG trace. In 2D-Mode, displays a scrolling image. In Doppler Mode, displays a scrolling ECG pointer. Active when cineloop is stopped.
- **Sample Volume** – enables the TRACKBALL to be assigned to control the size of the sample volume gate (in mm), in PW-Mode.
- **Scroll Results** – enables scrolling within the list of measurements taken and displayed in the measurement result list window.
- **Sensitivity** - active in CW, enables the sensitivity of the Doppler signal to be *increased*/*decreased*.
- **Simultaneous** – synchronizes all the cineloops to run simultaneously on the screen when working in multiple view. When turned off, only the image in the active segment of the screen will run. When running cineloops in split screen mode, enables cineloops to be run in only one window or in all windows.
- **Stop Cine** – stops the continuous playback of a cineloop when pressed. Active when cineloop is running.
- **Tilt** – enables the sector of the 2D image to be tilted to the left or right. By default, the axis of symmetry of a 2D image is vertical.
- **Triplex Live** - simultaneously presents 2D, Color, & PW - all live.
- **Variance** – enables the velocity variance calculation and display velocity variable as an indication of the amount of turbulent flow.
- **Velocity** – measures one velocity point on the Doppler window.
- **Velocity Scale** – controls the PRF (Pulse Repetition Frequency) values. It enables maximal detected velocity to be modified. In CFM, it also controls the distribution of shades in the color map over the different velocity values in the flow.
- **VF** – measures velocity time integral (VTI) and heart rate (HR) on the spectral Doppler window, and blood vessel diameter on the 2D window.
- Volumes -
- **Width** – controls the sector width in the case of a linear probe, and angular width for all other probes.

3D Option:

- **Layout - 3D** - enables the user to select the required 3D View Layout. Options available for selection:
  - 3D + Cube
  - Render
  - Main Plane
  - Landscape
- **Volumes** - enables the user to select the required 3D Viewing option. Choose from the following:
  - Gray
  - Color
  - Gray + Color

  NOTE:Volumes selection only available in Color/Angio Mode.
- **Auto Movie** - enables the user to record the rendering of a 3D image.
- **3D Reset** - returns the display to the initial default 3D Cube.
- **Scan Distance** - in post-processing, enables the user to manipulate the incremental distance between each neighboring scan plan.
- **Save As** - when enabled, used to save a 3D image to a hard drive, removable drive, floppy disk, etc.

Hip Joint Measurement:

- **Hip Joint** - enables the user to superimpose lines on an image and align them with anatomical features, for the calculation of Hip Joint Angles measurement.
- **Rotate Line -** used to rotate any of the three lines (superimposed on the image) to the required angle.
- **2D Caliper** - used to perform calculation of the angle between two lines.
- **Ellipse** - provides an alternative method of measuring two diameters (within an elliptical shape).
- **2 Diameters** - assigns a ratio to a hip joint measurement.

Biopsy Guide Option:

- **Biopsy Marker** - used to adjust and rotate the biopsy “depth marker” to the required position (estimates the penetration depth of the biopsy needle).
- **Biopsy Setup** - used to select one of three angles when changing the angle of the biopsy bracket attachment.

  NOTE:Only applicable to variable-angle adjustable bracket attachments.

Soft Menu Rocker Functions

The **Soft Menu** rocker enables access to mode-specific pop-up menus that provide display adjustment options. For additional information, refer to *Chapter 3, Modes* in the **Vivid 3 User's Manual**.

The Soft Menu Rocker functions are as follows:

- **Contour 2D** – enables the sharpness of images to be increased in the radial direction in 2D or M-Mode.
- **Diff (Difficult)** – reduces these reverberation artifacts, however frame rate will be reduced as a result. When set to 0 (zero), this function is active. The factory default for this function is 1.
- **Doppler DR** – adjusts the range of color scale used to represent the span of received signal strength from the blood. It makes the spectrum softer or harder.
- **Doppler Post Processing** – controls the amount of contrast of the Doppler display.
- **2D Dynamic Range** – enables control of the dynamic range or contrast of an image in 2D and Doppler Modes (in dB).
- **Flash Removal** – enables an algorithm that removes undesired color flashes due to probe motion or strong tissue motion. (Note: High values can cause a reduction of color sensitivity.)
- **Frame Rate** – enables the frame rate (in Hz) to be increased when examining fast moving tissue. When examining non-moving tissue, the frame rate can be decreased to increase resolution.
- **Frequency** – enables the transmission frequency in Doppler and Color Modes (in MHz) to be modified to control sensitivity or level of penetration.
- **Persistence** – enables adjustment of color images, so the current frame retains some color information from previous frames, to avoid noise.
- **Power** – controls the amount of acoustic power applied in all modes (in dB).
- **Reject 2D** – enables 2D (grey) reject in CFM-Mode. Setting is differential to the value set in 2D only. Returning to 2D-Mode disables Reject 2D.
- **Reject (Doppler)** – enables undesirable background noise to be removed from the Doppler spectrum.
- **Sample Volume** – controls the size of the CFM sample volume.
- **Steer Angle** – controls the angular direction of the ultrasound beam.
- **Lateral and Axial Smooth** – enables radial and lateral smoothing of the color pixels.

3D Option

The 3D package is a system option that enables 3D reconstruction, presentation, and manipulation of data acquired from the following:

- Regular Scan (2D, CFM, or Angio)
- Stored Cine (from an archive)

The 3D image is presented in a special window. Using the tools provided, the user is able to view and manipulate the image in several ways:

- Select a Region of Interest (ROI)
- Rotate the 3D image (using the trackball)
- Move the clipping planes (using the trackball)
- Change the visualization parameters and layout (using the keyboard functions on the control console).

To activate the 3D option:

1. Perform a free-hand scan (in 2D, CFM, or Angio) of a volume, either in parallel or in sweep format, as follows:

   To perform a *parallel* scan, scan evenly in a single direction

   To perform a *sweep* (fan) scan, rock the probe once in a single direction
2. Press **Freeze**.
3. Press **Function 3** on the control console. A white-frame ROI will appear over the image (in the center of the window), as shown in Figure 6. The ROI marks the region of the image which will be rendered into 3D.
4. If required, use the Trackball and Select button to position/resize the ROI correctly.

NOTE: The Function 3 button has a toggle action that hides/displays the 3D ROI.

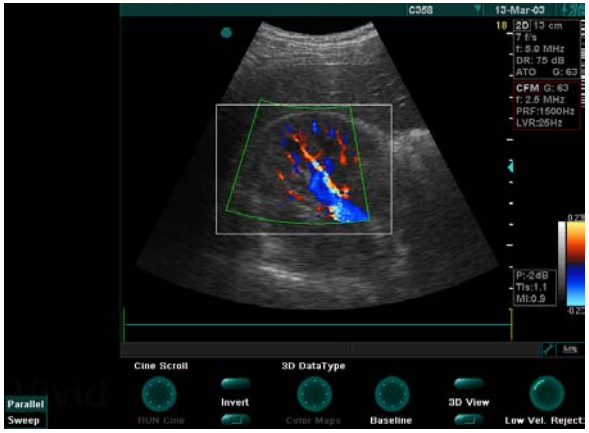
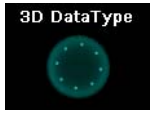


Figure 6: ROI displayed over the image

5. If required, press the **Run Cine** soft key and trim the temporal scan range as necessary, by adjusting the **First Marker** and **End Marker** soft rotary keys:

6. Press **Stop Cine** when done.
7. Use the **3D Data Type** rotary knob to select the sweep type: *Parallel* or *Sweep*. (Match the selection with what you scanned in Step 1).



   The default is Parallel.
8. Press **3D View** on the soft key menu.

   The message: "*3D data is loading. Please wait*." is displayed.

NOTE: Depending upon the amount of data to be loaded, this may take some time. Please be patient.

When completed, the message "*Data Loading Successful*" appears and the data is displayed in the scanning screen, as shown below.

NOTE: The 3D + Cube (shown above) is the default view Layout.

9. If preferred, use the **Layout** soft key rotary to change to the required 3D view Layout.
10. Use the tools provided to manipulate the 3D Volume of Interest (VOI), as required. See "Manipulating the 3D Volume of Interest" on page 26.
11. Examine the data and if necessary, use any other 3D option tools or functions as required.
12. To exit from 3D rendering at any time, press the **Function 3** button once again, or simply press **Freeze** to resume normal scanning.

Manipulating the 3D Volume of Interest

The 3D VOI is a tangible anatomical object that you can see and manipulate easily, using the **Trackball** and **Select** key on the Vivid 3 control console.

When performing this manipulation, you are able to precisely define the 3D VOI and examine the data within it.

For more detailed information, refer to the **Vivid 3 Release Notes SW 3.1**.

To rotate the 3D VOI:

1. Position the white trackball pointer (in the shape of a pointing finger) outside of the rectangle and press **Select**.
   The white hand will close, as shown in Figure 7.

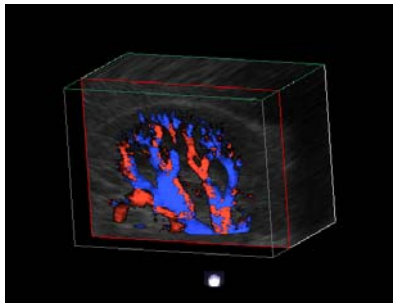


Figure 7: Rotating the 3D VOI (White Hand)

2. Trackball to rotate the 3D VOI in any direction, as required. You can also tilt it *backwards* or *forwards*, if necessary.
3. Press **Select** again to release the trackball from rotating the VOI. The white hand will open in the shape of a pointing finger.

To move through the 3D VOI:

1. Position the hand over one of the visible planes of the cube; the hand turns red.
2. Press **Select**. The selected plane is marked by a red frame and the trackball cursor shape changes to a red closed hand.
3. Use the Trackball to move the red plane through the 3D VOI, as shown in Figure 8.

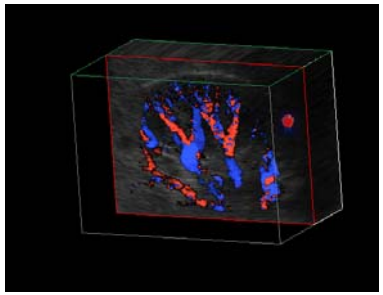


Figure 8: Moving through the 3D VOI (Red Hand)

NOTE: Any plane in the volume can be made active (highlighted by a red rectangle) by placing the red hand over it and clicking on it.

To manipulate the edge of the 3D VOI:

1. Position the trackball pointer over any visible edge. The hand pointer turns yellow.
2. Position the yellow pointer (in the shape of a pointing finger) on the required edge and press **Select**.
   The trackball cursor shape changes to a yellow closed hand and the edge of the selected plane (closest to the hand) becomes highlighted in yellow.
3. Use the Trackball to move the yellow hand (and the edge of the plane) accordingly - to view specific anatomical portions, as shown in Figure 9.

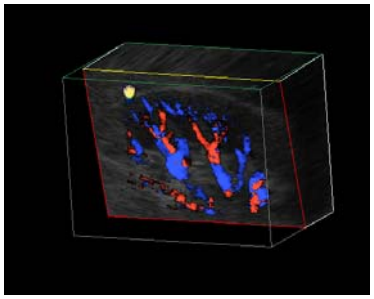


Figure 9: Manipulating the Edge of a 3D VOI (Yellow Hand)

NOTE: The yellow hand appears only when the pointer is on an edge of the 3D VOI. If the hand is not visible, trackball closer to the edge. Only the edge of the plane closest to the hand is highlighted in yellow.

To manipulate the corner of the 3D VOI:

1. Position the *green* trackball pointer (in the shape of a pointing finger) on one of the corners of the VOI and press **Select**.
   The trackball cursor shape changes to a green closed hand and a small green dot appears on the selected corner.
2. Use the Trackball to move the green hand and pull back the corner of the plane accordingly, as shown in Figure 8.

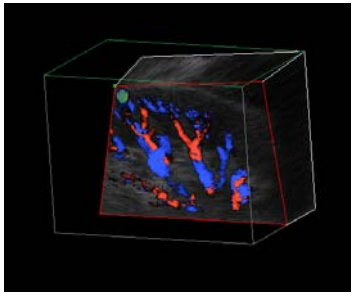


Figure 10: Manipulating the Corner of a 3D VOI (Green Hand)

Biopsy Guide Option

The Biopsy Guide package is a system option that supports the use of a Biopsy bracket and an on-screen Biopsy Guide Zone on the Vivid 3 ultrasound scanner.

The feature supports two types of brackets:

- Adjustable multi-angle bracket attachment (Civco model C358/3Cb/3C) for use with the curved C358 probe
- Fixed-angle bracket attachment (Civco model LA39) for use with 10L or 12L Linear probes

The display of an interactive Biopsy Guide Zone screen facilitates precise control over the angle and depth of the needle during the biopsy procedure. The Biopsy Guide Zone may be activated in 2D or Color mode.

NOTE: A bracket attachment is supplied in a "Starter Kit" together with some accessories in a separate Biopsy Kit. For details and a list of contents of the kit, refer to the ***Vivid 3 Release Notes SW 3.1****.*

Precautions for Use of Biopsy Procedures

WARNING: Do not *Freeze* the image during a biopsy procedure. The image must be live in order to avoid a positioning error.

Biopsy Guide Zones are intended to assist the user in determining optimal probe placement and approximate the needle path. However, actual needle movement is likely to deviate from the guide line. During the procedure, always monitor the relative positions of the biopsy needle and the subject mass.

CAUTION: The use of biopsy devices and accessories that have not been evaluated for use with this equipment may not be compatible and could result in injury.

CAUTION: The invasive nature of biopsy procedures requires proper preparation and technique to control infection and disease transmission. Equipment must be cleaned as appropriate for the procedure, prior to use.

- Follow the probe cleaning and disinfection procedures and precautions to properly prepare the probe.
- Follow the manufacturer's instructions for the cleaning of biopsy devices and accessories.
- Use protective barriers such as gloves and probe sheaths.
- After use, follow proper procedures for decontamination, cleaning, and waste disposal.

CAUTION: Improper cleaning methods and the use of certain cleaning and disinfecting agents can cause damage to the plastic components that will degrade imaging performance, or increase the risk of electric shock.

For more information, refer to the safety instructions supplied with each probe.

Displaying the Biopsy Guide Zone Screen

The Biopsy Guide Zone is an interactive display drawn on the screen, and associated with the currently-selected bracket angle of the probe attachment.

*NOTE: For a full description and detailed explanation of this feature, refer to the **Vivid 3 Release Notes SW 3.1**.*

*NOTE: The user is able to change the way in which the Biopsy Guide Zone is displayed, in accordance with individual preferences. For example, change the distance between dots; hide/display the center line, outer lines etc. For instructions, refer to the **Vivid 3 Release Notes SW 3.1**.*

To activate display of the Biopsy Guide Zone:

1. While in 2D or Color Mode, press **Biopsy** on the alphanumeric keyboard.

   If the current probe supports use of a biopsy bracket, the Biopsy Guide Zone is displayed on the screen, as shown in Figure 11 below.

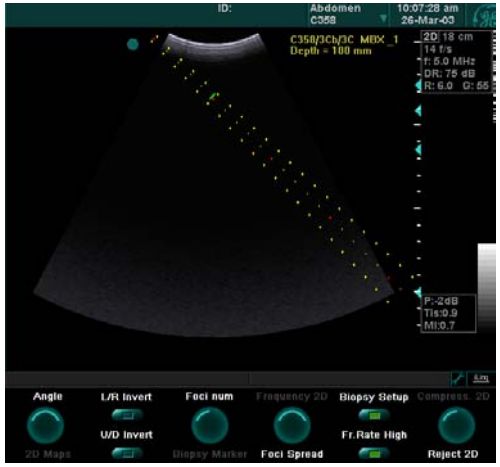


Figure 11: Biopsy Guide Zone displayed on screen

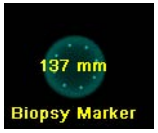
   The following message is displayed: "*Be sure to select the proper biopsy kit and set up the proper bracket angle*".

   For details on selecting the proper Biopsy Kit, refer to the information provided in the **Vivid 3 Release Notes SW 3.1**.

   For "Bracket Attachment Angle Set-up" see the instructions, below.

   NOTE: If the current probe does not support use of a biopsy bracket, the message "Biopsy Guide is not supported" is displayed.

2. Adjust the **Biopsy Marker** rotary and rotate it to move the "depth marker" to the required position. Use this tool to estimate the needle's penetration depth.



   The changed position of the depth marker is reflected on the screen.

Bracket Attachment Angle Set-up

*NOTE: This procedure is intended for variable-angle adjustable bracket attachment **only**.*

To change the angle of the bracket attachment:

1. Press the **Biopsy Setup** soft rotary key.

   A pop-up menu is displayed, showing pictures of the bracket attachment at three different angles, as shown in Figure 12.

Figure 12: Bracket Attachment Angle Selection Set-up

2. Select the required bracket angle (positions 1, 2, or 3) by clicking on one of the following: *MBX-1*, *MBX-2*, or *MBX-3*.

   Once the required bracket angle is selected, the pop-up menu closes and the Guide Zone display accordingly reflects the new selection.

*NOTE: If you wish to exit the pop-up menu without making changes to the bracket angle, simply click on **Exit**.*

3. Check the display at the top of the screen to make sure that the selected angle is appropriate. If not, repeat Step 2 to change the selection.

DANGER: Failure to match the screen-displayed Guide Zone to the physical angle of the bracket's needle guide may cause the needle to track a path outside the Guide Zone.

It is extremely important that when using the adjustable angle biopsy guides, the angle displayed on the screen matches the angle set on the guide, otherwise the needle will not follow the displayed guide zone. This could result in repeated biopsies, or even patient injury. For more details on Biopsy Needle Deviation, see the **Vivid 3 Release Notes SW 3.1**

NOTE: Whenever the system is turned OFF and ON again, the bracket-hole number - as well as the location of the depth marker - is maintained as before.

Preparing the Multi-Angle Guide Attachment

WARNING: *DO NOT* attempt to use the multi-angle biopsy bracket and needle guide until the manufacturer's instructions (provided with the biopsy bracket and needle guide in the Biopsy Kit), have been read and thoroughly understood.

To assemble the multi-angle biopsy guide:

1. Scan the patient and identify the target for the biopsy.
2. Move the probe to locate the target to the center of the image.
3. Enable the system Biopsy Guide Zone and try the guide zone angles MBX1, 2 or 3 to decide the best angle setting for the needle path. See "Displaying the Biopsy Guide Zone Screen" on page 28.
4. Identify the appropriate Biopsy Guide bracket by matching the label on the bracket with that on the probe to be used.

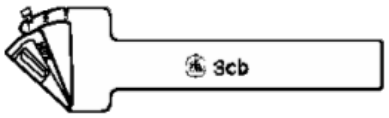


Figure 13: Multi-Angle Biopsy Guide Bracket

5. Orient the bracket so that the needle clip attachment will be on the same side as the orientation mark (ridge) on the side of the probe, as shown in Figure 14.

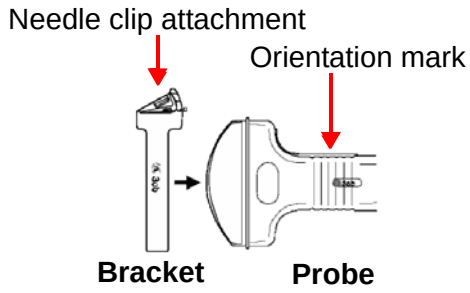


Figure 14: Aligning the Orientation Mark

6. Attach the biopsy bracket to the probe by sliding the bracket over the end of the probe until it clicks or locks in place.
7. Select the required needle guide attachment angle by pulling the metal locking pin *upwards* to freely move the needle guide attachment and slide it out of the slotted opening on the plastic bracket.

Locking pin in Position 1 Locking pin in new position

Figure 15: Changing Attachment Angle & Locking into Position

8. Align the pin with the currently-selected angle of the needle guide attachment in order to match that of the Guide Zone displayed on the Vivid 3 screen: MBX1, MBX2, or MBX3. For example, if MBX2 is selected, align the pin with position 2 (as shown above) and push it into position in the slot. Press the pin *downwards* to secure it firmly in place (see picture *on right*, in Figure 15 above).

CAUTION: When pushing the pin to secure the angle position of the needle guide attachment, hold the bracket firmly in place on the probe. Excessive force may cause the bracket to release from the probe.

9. Apply an adequate amount of coupling gel to the face of the probe.
10. Place the proper sanitary sheath tightly over the probe and biopsy bracket. To hold the sheath firmly in place, use the rubber bands supplied, as shown in Figure 16.

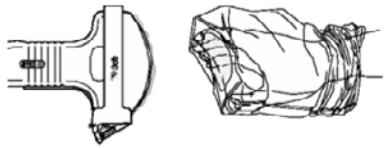


Figure 16: Applying the Sanitary Sheath to the Probe

11. Place the needle clip attachment onto the biopsy guide bracket and snap into position, as shown in Figure 17.

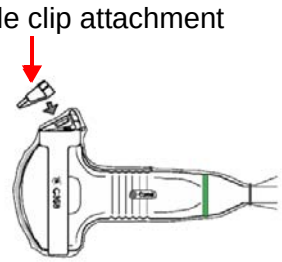


Figure 17: Fitting the Needle Clip Attachment onto the Biopsy Guide Bracket

12. Push the locking mechanism towards the bracket to secure the lock. Make sure the needle guide is firmly attached to the bracket - see Figure 18.

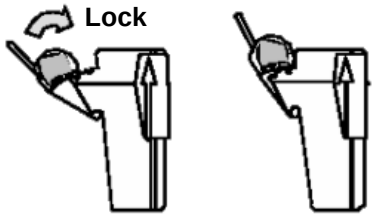


Figure 18: Locking the Needle Clip Attachment into Position

13. Choose a needle barrel of the required gauge (size) and twist it back and forth to remove it from the plastic holder (tree) - see below.

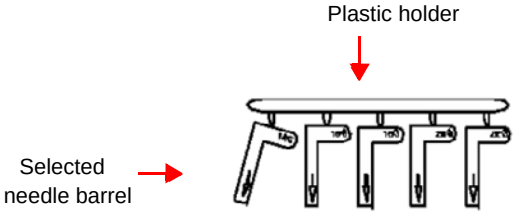


Figure 19: Removing the Needle Barrel from the Plastic Holder

14. Place the selected needle barrel into the needle clip (see note below) and push to snap into place - see Figure 20.

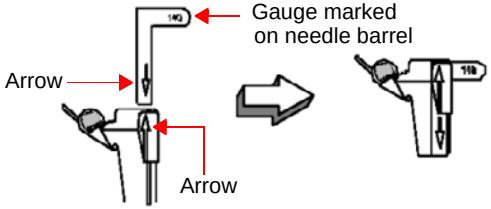


Figure 20: Needle Barrel Installation

NOTE: When inserting the needle barrel into the needle clip, make sure the two embossed arrow points are facing each other; in this way correct positioning is assured. The gauge marked on one side of the needle barrel will be visible, since this will be facing towards you (as shown in Figure 20).

Preparing the Fixed-Angle Guide Attachment

WARNING: *DO NOT* attempt to use the fixed-angle biopsy bracket and needle guide until the manufacturer's instructions (provided with the biopsy bracket and needle guide in the Biopsy Kit), have been read and thoroughly understood.

To assemble the fixed-angle biopsy guide:

1. Identify the appropriate biopsy guide bracket.
2. Orient the bracket so that the needle clip attachment will be on the same side as the orientation mark (ridge) on the side of the probe, as shown in Figure 14 on page 29.
3. Attach the biopsy bracket to the probe by sliding the bracket over the end of the probe until it clicks or locks in place.
4. Apply an adequate amount of coupling gel to the face of the probe.
5. Place the proper sanitary sheath tightly over the probe and biopsy bracket. To hold the sheath firmly in place, use the rubber bands supplied, as shown in Figure 16 on page 29.
6. Place the needle clip attachment onto the biopsy guide bracket and snap into position, as shown in Figure 17 on page 29.
7. Push the locking mechanism towards the bracket to secure the lock. Make sure the needle guide is firmly attached to the bracket - see Figure 18 on page 30.
8. Choose a needle barrel of the required gauge (size) and twist it back and forth to remove it from the plastic holder (tree) - refer to Figure 19 on page 30.
9. Place the selected needle barrel into the needle clip (see note below) and push to snap into place - see Figure 20 on page 30.

NOTE: When inserting the needle barrel into the needle clip, make sure the two embossed arrow points are facing each other; in this way correct positioning is assured. The gauge marked on one side of the needle barrel will be visible, since this will be facing towards you (as shown in Figure 20).

Performing the Biopsy Procedure

WARNING: Biopsy procedures must only be performed on live images.

CAUTION: Before performing a biopsy, ensure that all Biopsy Guide parts are seated properly. Refer to the following instructions, as appropriate: "Preparing the Multi-Angle Guide Attachment" on page 29; "Preparing the Fixed-Angle Guide Attachment" on page 30**.**

To perform the Biopsy procedure:

1. Place coupling gel on the scanning surface of the probe/sheath/biopsy guide assembly.
2. Activate the Biopsy Guide Zone on the Vivid 3 system by pressing **Biopsy** on the alphanumeric keyboard. (Refer to "Displaying the Biopsy Guide Zone Screen" on page 28).

   When using multi-angle guides, ensure that the proper Guide Zone angle is displayed. (Refer to "Bracket Attachment Angle Set-up" on page 28).
3. Scan to locate the target. Center the target in the electronic Guide Zone path.
4. Carefully place the needle in the guide between the needle barrel and needle clip. Direct it into the area of interest for specimen retrieval.

To complete the Biopsy procedure:

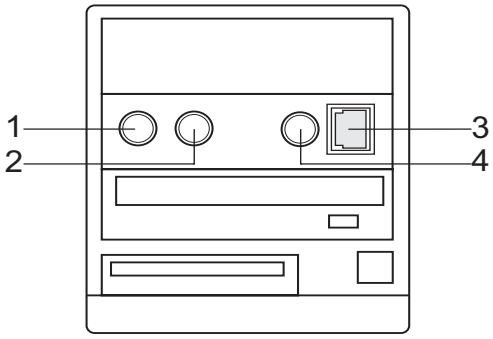
1. When the biopsy is complete, remove the needle barrel, needle clip and probe sheath.
2. Properly dispose of these items in accordance with current facility guidelines.

*NOTE: The biopsy bracket can be sterilized in a recommended disinfecting agent (refer to the manufacturer's instructions - see also the Biopsy Bracket Cleaning and Sterilization instructions provided in the **Vivid 3 Release Notes SW 3.1**), after which it may be re-used, as required.*

Physiological Traces

For additional information, see *Chapter 4, Physiological Traces* in the User's Manual.

Connecting the Electrodes



1. Footswitch (black)
2. Phono (blue)
3. Internal ECG (yellow)
4. ECG (green)

Adjusting ECG & Phono Display

Changing the Trace Sweep Speed in 2D-Mode

To change the trace sweep speed in 2D-Mode:

1. Press **Physio.** The ECG & Phono soft key menu is displayed.
2. Turn the **Horiz. Sweep** rotary to change the sweep speed.

Changing the ECG Trace Amplitude

To change the ECG trace amplitude:

1. Press **Physio.**
2. Turn **Gain ECG** rotary.

To change the ECG trace position:

1. Press **Physio**.
2. Turn **ECG position** rotary.

Selecting an External ECG Input

To select external ECG signal input:

1. Press **Physio**.
2. Press the **ECG Internal/External** soft key so that **External** is lit on screen. To return to the internal ECG unit, press the **ECG Internal/ External** soft key again so that **Internal** is lit on screen.

NOTE: ECG Internal/External can also be set by accessing the System Configuration and changing to the required settings under the ECG/VCR tab.

*NOTE: If any ECG trace problems occur, use the **Reset ECG** soft key.*

Hiding the ECG Signal Trace

To hide the ECG signal trace:

1. Press **Physio** .
2. Press the **ECG** soft key to hide the ECG signal trace. The on-screen LED will dim. Press the **ECG** soft key again to display the ECG signal trace.

Using the Heart Sound Microphone Device

To use the heart sound microphone device:

1. Connect a microphone cable in the Rear Connector Panel.
2. Press **Physio**.
3. Press the **Phono** soft key to display the Phono trace.

Changing the Phono Trace Position

To change the Phono trace position:

1. Press **Physio**.
2. Press the **ECG position / Phono Position** soft key rotary to activate the **Phono position** function.
3. Turn the **Phono position** soft key rotary.

Selecting a Phono Filter

To select the Phono filter:

1. Press **Physio**.
2. Press the **Horiz. Sweep / Phono_Filter** soft key rotary to activate the **Phono Filter** function.
3. Turn the **Phono_Filter** soft key rotary to select the appropriate phono filter.

Stress Echo

For additional information, see *Chapter 5, Stress Echo* in the User's Manual.

Accessing Stress Echo Mode

To access Stress Echo Mode and select a stress protocol:

1. Press **Protocol**. A list of available stress protocol templates is displayed on the clipboard.

NOTE: Stress protocol templates can be edited or created, as described in Chapter 5,Stress Echo in the User's Manual.

2. Use the **Select Template** soft key rotary to highlight the required template.
3. After selecting the required protocol, press **Freeze** to exit Freeze Mode and begin acquisition.The name of the selected template is displayed at the top of the clipboard.

Acquisition

Selecting an Image

To begin acquisition:

1. Toggle **Freeze** to off.
2. Perform a scan in 2D-Mode.
3. Press **Freeze** to stop and replay the last complete heart-loop.
4. After selecting the preferred loop, press **Store.**
5. Repeat previous steps until all required projections have been made and completed.

*NOTE: You may also press **Store** twice (to accept loops) without performing Steps 1 -3 above.*

To select a loop on a Quad View display:

1. Follow steps 1 – 3 of the previous procedure to acquire an image.
2. Press the **Quad View** soft key so the relevant on-screen icon is selected.
3. TRACKBALL to the required quad window and press **Select**.
4. Manually select the required image using the soft keys and soft key rotaries.
5. Press **Store**.
6. Repeat the previous steps until all required projections have been acquired and completed.

Deleting or Replacing Acquired Images

To delete an acquired image:

1. TRACKBALL to the projection/level image cell and press **Select**.
2. Press **Menu**. The **Delete** option is displayed. TRACKBALL to the on-screen **Delete** button and press **Select**. A pop-up dialog box, requesting confirmation of the deletion is displayed.
3. TRACKBALL to **Yes** and press **Select**.

NOTE: To delete a level, the selected level must not contain any images.

To replace an acquired image:

1. TRACKBALL to the projection/level image cell that is to be replaced in the clipboard's matrix and press **Select**.
2. Press **Store**.
3. TRACKBALL to **Yes** and press **Select**.

Setting Timers for Projections and Levels

Two timers (T1 and T2) are displayed in the top left corner of the image area, adjacent to the projection matrix, beneath the projection and level names.

- **TI**, which is displayed at all times, displays the elapsed time from the start of the stress examination.
- **T2** is a level timer. It can be used to display the time lapse between levels when the **Dobutomine** template has been selected; or the number of seconds captured in the continuous capture buffer when an **Exercise** template has been selected.

Important: The user must save the report in order to be able to view the report at a later time with the images as placed. Once a report is saved, no data or image can be added to the same report.

To display or remove the T2 timer from the image screen:

- TRACKBALL to the on-screen T2 timer icon button which is located beneath the projection matrix, and press **Select** to toggle the button on/off. The T2 timer is displayed under the T1 timer display on the image area.

To start or re-start the T2 timer:

- TRACKBALL to **Start**, which is located beneath the projection matrix next to the **T2** button, and press **Select**. The **Start** button changes to **Stop**.

To stop the T2 timer:

- TRACKBALL to **Stop** and press **Select**.

Analysis

Scoring Acquired Heart Cycles

To analyze stress echo data:

1. Press **Freeze**.
2. Press the **Analyze** soft key. The system automatically displays a quad view of the first group of images to be analyzed and scored on the screen. The current group's name will appear in the prompt bar.

Scoring Stress Echo Data

To score stress echo data:

1. TRACKBALL to a segment in one of the scoring diagrams and press **Menu**. A pop-up menu is displayed.
2. TRACKBALL to a score and press **Select**.
3. Repeat steps 1 and 2, until all segments have been assessed and scored.

BullsEye Scoring Diagram

- TRACKBALL to a **BullsEye View** and press **Select**.

NOTE: A checkmark is displayed next to the selected BullsEye scoring method for the specific protocol.

Exercise Stress Examinations

Exercise stress examinations are similar to previously described examinations, except that image acquisition is performed continuously for all projections of the level. The acquisition procedure for the Rest level is the same as described in *Chapter 5, Stress Echo* of the User's Manual.

Important: When *continuous capture* mode is selected, the system automatically displays **Capture Paused** at the bottom of the clipboard.

Important: A buffer bar is displayed at the bottom of the clipboard area. The percentage (%) of the buffer that is filled is displayed on the bar. The *green* portion of the bar reflects the available buffer space and the *red* portion reflects the filled buffer.
A *yellow* vertical line on the buffer bar reflects a gap of time in the capturing process (stopping). A *blue* vertical line on the bar reflects the location of the image displayed, within the buffer area.

To control the capture process:

- Use **2D Update** to toggle between Pause and Capture (unpause) modes.
- Use **Freeze** to stop capture. In this mode, the last heart cycle captured is replayed on the screen.

NOTE: The system enters Freeze Mode automatically once the buffer is totally full (99%).

Selecting and Storing Heart Cycles

After the buffer is filled with continuously captured cycles, the user can begin to review the contents of the buffer and store images to the scoring matrix.

The procedure options available for reviewing the contents of the buffer are described below.

To review and select the buffer bar's captures in Full View:

- Use the **Previous/Next** soft key rotary to scroll through the buffer. A blue line indicates the location of the heart cycle in the buffer bar, and the heart cycle is displayed on the screen,

To enter, review, and select the captures in the buffer bar in quad view:

1. Press the **Quad View** soft key. The first four captured heart cycles are displayed.

*NOTE: If the **Quad View** soft key is not available, press **Active Mode.** Scroll using Active Mode through the different soft key menu options, while in Freeze Mode, until the **Quad View** soft key is displayed.*

2. Use the **Previous/Next** soft key rotary to scroll through the buffer to display the four previous or next heart cycles. A blue line indicates the location of the first window's heart cycle in the buffer bar.

To store heart cycles selected from the buffer bar:

1. Press **Store**.
2. Follow the procedures for analysis, described in *Chapter 5, Stress Echo* of the User's Manual.

*NOTE: Press **Exit** to return to continuous capture acquire mode.*

Displaying, Hiding, or Resetting the Capture Buffer

To display, hide, or reset the capture buffer:

1. TRACKBALL to the template name and press **Select**.
2. TRACKBALL to the required option and press **Select.**

NOTE: For details on viewing scoring and measurements during the Stress exam, refer to "Reporting" on page 52.

Editing and/or Creating Stress Templates

Selecting a Base Template

To select a base template:

1. Press **Protocol.**
2. Use the **Select Template** soft key rotary to highlight the one to use as the basis of the new stress template.

Adding/Deleting Levels

To add levels:

- Rotate the **Set Levels** or (**Set Peak Level**) soft key rotary clockwise until the required number of levels is reached.

To delete levels:

- Rotate the **Set Levels** (or **Set Peak Level**) soft key rotary counter-clockwise to remove the unrequired level/s

NOTE: Be sure not to remove the last and soliday Peak level. Once no Peak level remains in the template, the user will not be able to add a Peak level to the template.

Assigning New Labels to Levels or Projections

To assign new labels to projections:

1. TRACKBALL to the projection label that is to be changed and press **Menu**. A pop-up menu is displayed with a list of available labels.
2. TRACKBALL to the required projection label and press **Select**.

NOTE: Once a level has an image stored, the label of that level can no longer be changed.

Defining New Groups

To assign a name to a group of image cells:

1. TRACKBALL to the group name that is to be changed in the group list and press **Select**.

NOTE: If cells are assigned while the group name is highlighted, the cells associated with the group will be identified by yellow frames.

*NOTE: If the vertical cursor is not displayed in the desired location, move the cursor with the TRACKBALL and press **Select** again to reassign cursor location.*

2. Use the alphanumeric keyboard to enter a new name.

To define cell options:

Cell options, such as whether or not the T2 timer is displayed, or when scoring is entered, can be configured for each cell.

1. TRACKBALL to the required image cell and press **Select**.
2. Press **Menu**.
   A pop-up menu with cell editing options is displayed (e.g., Delete, Enter Quad on Freeze, Unfreeze after Store, Timer 2 Reset or Off, Enter Scoring).

Deleting Groups

To delete a group:

1. TRACKBALL to the name of the group that is to be deleted along the right side of the screen and press **Menu**.
2. TRACKBALL to **Empty** and press **Select**. The group is removed.

Saving an Edited Stress Template

To save an edited stress template:

1. Press the **Save** soft key. A dialog box is displayed.
2. Use the alphanumeric keyboard to enter a new name for the template.
3. TRACKBALL to **OK** and press **Select**.
4. Press **Freeze** and begin the stress acquisition procedure.

To delete an edited stress template:

1. TRACKBALL to the name of the template that is to be deleted and press **Select**.
2. Press the **Delete** soft key.
3. TRACKBALL to **Yes** and press **Select**.

NOTE: The Stress application has additional capabilities. For further information on using the Echo Stress Package, see the Vivid 3 Pro/Expert SW 2.2 Release Notes.

Cardiac Measurement and Analysis

For additional information, see *Chapter 6, Cardiac Measurements* in the User's Manual.

Measure and Assign

The **Caliper** button activates the **Measure and Assign** convention, as well as the basic **Measure** convention.

- A maximum of eight measurements can be displayed on the screen at once.
- The last measurement is highlighted.
- The soft key icons indicate the available measurement tools.

Performing Measurements

2D-Mode

Length Measurements

1. Generate the image to be measured and press **Freeze**.
2. Press **Caliper**.
3. Press the **2D Caliper** soft key.
4. TRACKBALL to the start point of the measurement, and press **Select** to anchor the caliper.
5. TRACKBALL to the measurement end point.
6. Press **Select** to anchor the caliper.
7. Repeat steps 4 – 6 for additional measurements.
8. Assign a label to the measurements.

Area Measurements

1. Generate the image to be measured and press **Freeze**.
2. Press **Caliper**.
3. Press the **2D Area** soft key.
4. TRACKBALL to the start point of the measurement and press **Select** to anchor the caliper.
5. TRACKBALL along the outline of the area.
6. Press **Select** to close the trace.
7. Repeat steps 4 – 6 for additional measurements.
8. Assign a label to the measurements.

NOTE: To correct a trace after it has been closed, double-click on the marker located on the trace. The straight line that closed the trace is removed. Use the TRACKBALL *or* <**Backspace**> *to make the correction.*

Volume Measurements

1. Select the image to be measured and press **Freeze**.
2. Press **Caliper**.
3. Press the **2D Volume** soft key.
4. TRACKBALL to the starting point at which the volume is to be measured and press **Select** to anchor the caliper.
5. TRACKBALL around the area to be used for the volume calculation and press **Select** to fix the end point.
6. TRACKBALL the end point of the axis to the required location and press **Select** to complete the measurement.
7. Repeat steps 4 – 6 for additional measurements.
8. Assign labels to the measurements.

Heart Rate (HR) Measurement

1. Select an image to be measured and press **Freeze**.
2. Press **Caliper**.
3. Press the **HR** soft key.
4. If the heart rate value is acceptable,

   TRACKBALL to the and press **Select**.
   OR
   use the **First Marker** or **End Marker** soft rotaries to correct the position, or use the **Previous/Next** soft rotary to skip to a different heart cycle.
5. To cancel the measurement, TRACKBALL to the and press **Select**.

M-Mode

M Caliper Measurements

1. Select the image to be measured and press **Freeze**.
2. Press **Caliper**.
3. Press the **M Caliper** soft key.
4. TRACKBALL to the start point of the measurement and press **Select** to anchor the caliper.
5. TRACKBALL to the measurement end point.
6. Press **Select** to anchor the caliper.
7. Repeat steps 4 – 6 for additional measurements.
8. Assign lables to the measurements.

Height Measurements

1. Select the image to be measured and press **Freeze**.
2. Press **Caliper**.
3. Press the **M Height** soft key.
4. TRACKBALL along the time axis and press **Select** to anchor the caliper.
5. TRACKBALL to the measurement end point.
6. Press **Select** to anchor the end point.
7. Repeat steps 4 – 6 for additional measurements.
8. Assign labels to the measurements.

LV Measurements

1. Select the image to be measured and press **Freeze**.
2. Press **Caliper**.
3. Press the **LV** soft key.
4. TRACKBALL to the required location on the time axis and press **Select**.
5. TRACKBALL to the PW anterior point, and press **Select**.
6. TRACKBALL to the septum posterior point and press **Select**.
7. TRACKBALL to the PW posterior point and press **Select**.
8. TRACKBALL to the required location on the time axis and press **Select**.
9. TRACKBALL to the septum posterior point and press **Select**.
10. TRACKBALL to the PW anterior point and press **Select**.
11. TRACKBALL to the PW posterior point and press **Select**.

Heart Rate Measurements

See “Heart Rate (HR) Measurement” on page 37.

Doppler Mode

Velocity and Pressure Measurements

1. Generate the spectrum to be measured and press **Freeze**.
2. Press **Caliper**.
3. Press the **Velocity** soft key.
4. TRACKBALL to the required point and press **Select**.
5. Repeat steps 4 –6 for additional measurements.
6. Assign labels to the measurements.

Doppler Caliper Measurements

1. Generate the spectrum to be measured and press **Freeze**.
2. Press **Caliper**.
3. Press the **D Caliper** soft key.
4. TRACKBALL to the start point of the measurement and press **Select**.
5. TRACKBALL to the end point of the measurement and press **Select**.
6. Repeat steps 4 – 5 for additional measurements.
7. Assign labels to the measurements.

Manual Trace Measurements

1. Generate the spectrum to be measured and press **Freeze**.
2. Press **Caliper**.
3. Press the **Man Trace/Auto Trace** soft key to activate the **Man Trace** tool.
4. TRACKBALL to the start point of the trace and press **Select**.
5. Use the TRACKBALL to trace the Doppler envelope from left to right.
6. Press **Select**.
7. Repeat steps 4 – 6 for additional measurements.
8. Assign labels to the measurements.

Automatic Trace Measurements

1. Generate the spectrum to be measured and press **Freeze**.
2. Press **Caliper**.
3. Press the **Man Trace/Auto Trace** soft key twice to activate the **Auto Trace** tool.
4. TRACKBALL to any time position over the required heart cycle on the spectrum.
5. Press **Select**.
6. To correct the measurement, see *Chapter 6, Cardiac Measurement and Analysis* in the User’s Manual.
   - To realign the entire envelope, rotate the **Envelope Adj** soft key rotary. Rotate clockwise to lower the envelope, or counterclockwise to raise the envelope.

Cardiac Output

1. Measure the LVOT diameter in 2D/M Mode.
2. Generate the spectrum to be measured and press **Freeze**.
3. Press **Caliper**.
4. Press the **CO** soft key.
5. TRACKBALL to the start time point of the trace and press **Select**.
6. Use the TRACKBALL to trace the Doppler envelope from left to right on the required part of the spectrum and press **Select**.
7. TRACKBALL to the bar to indicate the end of the heart cycle and press **Select**.
8. To obtain the Cardiac Output (CO) estimation, assign the result to SystCo (systolic cardiac output), or to one of the heart valves.
9. The corresponding cross-sectional diameter of the valve measured in Step 8 should be measured and assigned using a corresponding 2D image.

NOTE: The ***CO*** *will be calculated, and will be displayed on the screen and in the Worksheet.*

General Controls

Highlighting Measurements

To highlight a measurement:

- TRACKBALL to the required measurement marker on the image,
  OR
  TRACKBALL to the required measurement in the result table in the upper-left corner of the screen. The measurement is highlighted in green and can be modified.

NOTE: There is an option to jump automatically to the next measurement.

Modifying Measurements

To modify a measurement:

1. Highlight the required measurements.
2. Press **Select** twice.
3. TRACKBALL the marker to the required position and press **Select** to anchor the marker.
4. Perform the required modifications.

Assigning a Parameter Label After Measurement

- A measurement can be taken more than once. Only the last measurement for a specific parameter label can be active and can be modified.
- The last six measurements for a parameter can be saved in the database and viewed in the Worksheet.
- A measurement that has not been assigned to a parameter will not be retained in the database.

To assign a predefined parameter label to a measurement:

1. Highlight the required measurement.
2. Press **Menu**.
3. TRACKBALL to the required label abbreviation.
4. Press **Select**.

To assign a user-defined parameter label to a measurement:

1. Highlight the required measurement.
2. Press **Menu**.
3. TRACKBALL to **User** and press **Select**.
4. Use the alphanumeric keyboard to enter the required label.
5. TRACKBALL to **OK** and press **Select**.

Deleting Assigned Measurements

To delete assigned measurements:

1. Highlight the required measurement.
2. Press **Menu**.
3. TRACKBALL to **Delete** and press **Select**.

   OR

1. Highlight the required measurement.
2. Press <**Delete**>. The highlighted measurement is deleted from the image and from the database.
   OR
   Press <**Del Meas**>.

To remove/clear all the measurements from the screen:

- Press **Exit**.
  OR
  Press **Caliper**.

NOTE: When measurements are removed using the above procedure, measurements that have been assigned are retained in the database.

Controlling the Result Table Size

To modify the size of the Result table:

- Rotate the **Resize Results/Scroll Results** soft key rotary.

To scroll through the result table:

1. Press the **Resize Results/Scroll Results** soft key rotary to enable the **Scroll Results** function.
2. Rotate the **Resize Results/Scroll Result**s soft key rotary to scroll up or down through the results displayed in the Result table.

Assign and Measure

The **Measure** button activates this convention.

A list of studies (protocols) is displayed on the clipboard area on the left of the screen. Each study consists of a list of measurement labels. Measurements are taken according to the order of the listed measurement labels for the selected study.

See the Reference Manual for a full list of all available studies and parameters.

NOTE: The user can reconfigure the individual studies and their parameters. For further information, refer to Chapter 14, Presets and System Setup in the User's Manual.

To select a study (protocol) and perform a measurement:

1. Press **Measure**.
2. TRACKBALL to the required study and press **Select**.
3. Perform the measurement and press **Select**. The system will automatically jump to the next measurement to be performed, unless the **Autojump** option is enabled.

To select a different study:

- TRACKBALL to the required study and press **Select**.

Worksheet

All the measurements and calculations taken during the examination can be viewed at any time using the Worksheet. The Worksheet is the only source that retains all the measurement information.

The Worksheet enables the user to view, edit, delete or print data independently of a report. Measurements and values can be changed or deleted.

Worksheet formats provided are:

- **Normal**: Displays the parameters and calculations for which measurements have been assigned.
- **Compact**: Displays only the value of the measurements and calculations, and not the measurements themselves.
- **Expanded**: Displays all available parameters and calculations, regardless of whether measurements have been assigned to them.

Accessing a Worksheet

To access a Worksheet:

- Press **Worksheet**.
  On the left side of the screen, the list of mode-specific pages for the Worksheet is displayed in the clipboard area. The current page is highlighted (by default, this is according to the currently-selected application).
- You are able to scroll through different worksheets, then highlight the required worksheet and select it by pressing the **Select Worksheet** button. The selected Worksheet list is displayed in the upper left side of the screen.

To scroll through the pages:

- Use the **Scroll Pages** soft key rotary to navigate.
  OR
  TRACKBALL to the required page and press **Select**.

To scroll within a mode-specific page:

- Use the **Scroll Content** soft key rotary to navigate.

To adjust the method by which a calculation is made:

1. TRACKBALL to the relevant cell in the **Method** column and press **Select**.
   The following options are available:
   - Min
   - Max
   - Last
   - Aver
2. TRACKBALL to the required option and press **Select**. The values are recalculated.

Including or Excluding Values in a Calculation

- TRACKBALL to the measurement that is to be included/excluded from the calculation and toggle **Select**.

*NOTE: An excluded measurement changes color to signify that its value has not been included in the calculation. The value in the **Value** field is adjusted accordingly.*

Manually Changing a Value

1. TRACKBALL to the value that is to be changed and press **Select**.
2. Use the alphanumeric keyboard to enter the required value. An asterisk (*) indicates that the value has been manually altered.

*NOTE: To restore automatic calculation, position the TRACKBALL over the asterisk and press **Select**. The manually entered value is replaced by an automatically calculated value.*

Vascular Measurement and Analysis

For additional information, see *Chapter 7, Vascular Measurement and Analysis* in the User's Manual.

The general operation of the vascular package is similar to that of the cardiac package. Refer to the functions described in *Chapter 6, Cardiac Measurement and Analysis* in the User's Manual.

Measurement Tools

2D-Mode Tools

Distance (2D Caliper)

See "2D-Mode" on page 37.

Percentage D Reduction (%DR)

- Press the **%DR** soft key.

Percentage A Reduction (%AR)

- Press the **%AR** soft key.

Area (2D Area)

- Press the **2D Area** soft key.

Doppler Mode Tools

Velocity

1. Generate the spectrum to be measured and press **Freeze**.
2. Press **Caliper**.
3. Press the **Velocity** soft key.
4. TRACKBALL to the point of measurement for the velocity on the spectrum.
5. To make a measurement, press **Select** to anchor the caliper.
6. Repeat steps 4 – 5 for any additional measurements.
7. Assign labels to measurements, if required.

PS & ED

1. Generate the spectrum to be measured and press **Freeze**.
2. Press **Caliper**.
3. Press the **PS & ED** soft key.
4. TRACKBALL to peak systolic point of the spectrum and press **Select**.
5. TRACKBALL the second caliper to the end diastolic point on the spectrum.
6. Press **Select** to anchor the caliper.

Automatic Trace

See "Automatic Trace Measurements" on page 38.

Manual Trace

See "Manual Trace Measurements" on page 38.

Volume Flow

1. Generate the spectrum to be measured and press **Freeze**.
2. Press **Caliper**.
3. Press the **VF** soft key.
4. TRACKBALL to any time position over the required heart cycle and press **Select**.
5. To correct the time measurement, place the TRACKBALL on any border and double-click **Select**. Reposition and anchor the point in the new location by pressing **Select**.
6. TRACKBALL to the 2D image to measure the blood vessel diameter.
7. TRACKBALL the caliper to the start point of the measurement and press **Select** to anchor the caliper.
8. TRACKBALL the second caliper to the end point of the measurement and press **Select**.
9. TRACKBALL the cursor arrow to the desired vessel and press **Select**.
10. Repeat steps 4 – 9 to make additional measurements.

Real-time Spectral Tracing and Measurement Function

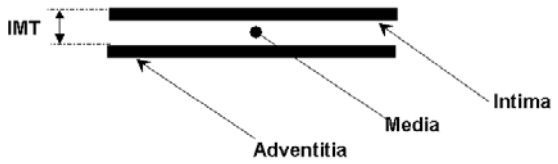
1. Perform a scan in one of the Doppler Modes.
2. Press **Trackball**, and position the TRACKBALL over the spectrum.
3. Press **Menu**.
4. TRACKBALL to **Show** and press **Select**. To disable the function, press **Select** again.
5. Select **Positive**, **Negative,** or **Both**.

*NOTE: The accuracy of the tracing may be adjusted by using **Envelope Adjustment** enabled by pressing the* **Soft Menu** *Rocker. Using the vertical arrows, select Envelope Adjustment. Use the horizontal arrows for adjustment.*

Important: The same functions also can be performed on frozen Doppler or archived images.

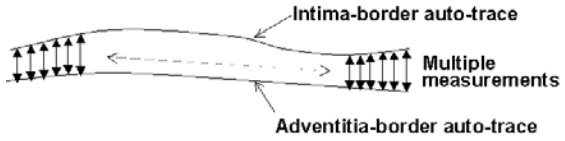
Automatic IMT Carotid Artery Measurement

Use this feature to measure the IMT (Intima-Media Thickness) of the posterior wall of the Carotid artery, as shown in the following figure:



Measure the IMT using any good-quality 2D image of the carotid. Standard scan optimization is required, such as is required to produce any good-quality image of the vessel.

The IMT measurement is based on automatic tracing of the leading edge of the intima surface and the leading edge of the adventitia surface. After tracing the two surfaces, multiple measurements are made between pairs of pixels located on both traces, as shown in the following figure:



If some parts of the intima or adventitia are not sufficiently clear, the tracing algorithm omits them. As a result, the trace may appear discontinuous. To ensure accuracy, measurements are only taken from parts of the trace which have been drawn.

As soon as the trace is drawn and the multiple measurements are made, the result window (shown in Figure 1:) displays:

- The average of all of the measurement points for the present trace (**RTCCA IMT)**.
- The standard deviation calculated for all of the measured points from the current trace (**RTCCA IMT Sd**).
- The maximum value (**RTCCA IMT Max**).

NOTE:
Due to the physics of ultrasound imaging, the IMT of the anterior (near) wall of the carotid might be incorrect. This is due to ultrasound artifacts. We therefore recommend measuring IMT from the posterior wall only. The algorithm in this package is set to measure the IMT from the posterior wall only.

NOTE:
Variations in blood pressure during the heart-cycle cause the IMT to change. Therefore, we recommend measuring the IMT at ED (end-diastolic).

General Workflow

Scanning

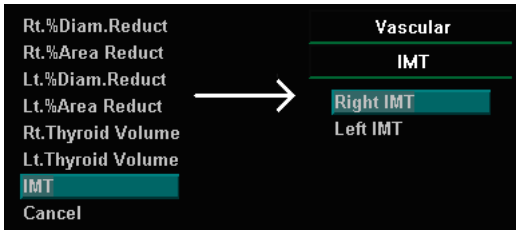
1. Generate a longitudinal scan of the carotid artery using normal scanning methods.

NOTE: In order to locate the ED time segment easily, we recommend using the ECG when doing the IMT measurement.

2. Optimize the posterior wall of the carotid. The measurement will be made from there.
3. When the image is optimized, press **Freeze**.

Measuring

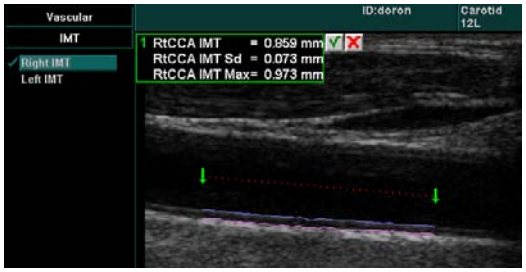
4. Use TRACKBALL to browse the cine-loop and locate a frame that was acquired during end-diastolic (ED). Activate ZOOM to improve accuracy.
5. Press **Measure**.
6. Select **IMT**.
7. Select either Left IMT or Right IMT, as shown in the following figure:



8. Place a vertical arrow anywhere inside the carotid. This marks the area in the carotid where IMT tracing starts.
9. Press **SET**. A second vertical arrow appears.
10. Position the second vertical arrow to mark the end of the segment where IMT measurement should take place.

11. Press **SET**. The system automatically traces the leading edges of both the intima and adventitia layers as shown in Figure 1:.
12. As shown in Figure 1:, view the automatic tracing to determine if the tracing closely fits the two layers.

Figure 1: Tracing viewed in the Results Window



Approval or Rejection of Measurement Result

13. If the tracing correctly fits both layers of the posterior wall, approve the measurement by clicking the green checkmark shown in the upper-right corner of Figure 2:. If approved, the IMT measurement will be added to the worksheet and the database. Continue with step 17.

Figure 2: Approve or Reject the Measurement

14. If the tracing is not perfect, try to improve it by adjusting the algorithm-sensitivity using the **Sensitivity** soft-menu button. The tracing will adjust in real-time, thereby allowing you to determine the best setting. When the tracing correctly fits both layers of the posterior wall, approve the measurement by clicking the green checkmark shown in Figure 2:.
15. If the tracing is not correct, or not close enough to follow the layer-borders correctly:
    a. Click the red X shown in Figure 2:. Clicking the red X deletes the results from the screen.
    b. Find a different frame—one which is sharper or cleaner to view—in close vicinity to the end-diastolic portion of the ECG.
    c. Press **Measure**.
    d. Continue from step 6 above and approve the measurement.
16. If there is no acceptable frame, un-freeze and re-scan the carotid. This will produce a better view of the posterior wall.

Assigning and Viewing the Results

17. Optionally, press **Worksheet** to view the results of this measurement and all approved measurements made during the current exam. It is possible to view the worksheet, or delete a measurement, at any time during the exam.
18. Press **Unfreeze** to repeat the scan and measurement described above. The scan can be repeated on the carotid artery on another side of the body or on a different segment of the carotid artery. Alternately, repeat the scan on the same area of the carotid. This will improve the measurement by averaging several measurements together.

Retrieving from Archive

As with any other tool on the Vivid-3 it is possible to retrieve a frame or a loop from archive and perform the IMT measurement on the stored image. Begin by following step 4 above.

Shared Services

Operating Room (OR) Package

For additional information, see *Chapter 8, Shared Services* in the User's Manual.

Automatic Tissue Optimization

The system sets acquisition and display parameters by applying image-specific optimized compression, frequency, gain, axial, and lateral TGC settings.

For details, refer to Automatic Tissue Optimization (ATO) on page 18.

FlexiView

FlexiView enables simultaneous viewing of synchronized live scan and stored reference cineloops, along with a predetermined time incremental cineloop storage capability.

Important: FlexiView is accessible only from the dedicated OR presets, for the 5T and 6T probes.

NOTE: For detailed information on using the FlexiView Split Screen or Quad Screen, refer to the Vivid 3 Pro/Expert SW 2.2 Release Notes.

FlexiView Quad Screen

- The upper-right window displays the live image being scanned.
- The two left windows display the reference cineloops, as determined by the user. these cineloops are labeled Ref.1 and Ref. 2.
- When configured by the user, automatic time-triggered storage occurs, and the most recently stored cineloop is displayed in the lower-right window, below the live image.

To activate the FlexiView quad screen display:

1. Select an OR preset.

NOTE: Use the **Active Menu** *button to toggle between this displayed soft key menu and the regular* **2D-Mode** *soft key menu.*

2. Press the **LV Monitoring** soft key to enable FlexiView.

Reference (Baseline) Cineloops

To assign a stored cineloop as a reference cineloop:

1. Press **Freeze**.
2. Press TRACKBALL. A cursor appears.
3. **TRACKBALL** to the reference window in which the stored cineloop from the clipboard is to be placed and press **Select**. The window is highlighted in a yellow frame.
4. TRACKBALL to the desired image icon on the clipboard and press **Select**.
5. To unfreeze the live scan, press **Freeze** again.

Predefined Automatic Time-Triggered Cineloop Storage

NOTE: Refer to the Archive Tab section in Chapter 14, Presets and System Setup in the User's Manual.

The lower-right window will automatically update as each subsequent cineloop is stored at the time interval. The cineloop from that window will then be removed (although still displayed on the clipboard.)

To manually store an image during a procedure:

- Press **Store** once if the Preview Cine Before option is not configured for the system. (Refer to the Archive Tab section in *Chapter 14, Presets and System Setup* in the User's Manual)
  OR
  Press **Store** twice if the Preview Cine Before Store option is configured for the System.

"Time from Start" Stamp

The time that has passed since the scan began ("Time from Start") is displayed in the upper-left corner of the live window. All cineloops stored in the archive retain the "Time from Start" stamp.

NOTE: The timer of the live scan can be reset at any time.

To reset the "Time from Start" timer:

1. TRACKBALL to the timer displayed in the upper-left corner of the live image window.
2. Press **Menu**.
3. TRACKBALL to the **Reset Time** option and press **Select**. The next automatically stored loop will reflect the new "Time from Start".

FlexiView for Single Screen

A full single screen option enables the user to view full screen, live scanned images in all modes. Automatic storage of cineloops to the clipboard according to user configured, predefined time intervals takes place, without interrupting the procedure.

To activate full single screen FlexiView:

1. Select an OR preset.
2. Press the **LV Monitoring** soft key. The screen automatically changes to a quad screen display.
3. Press the **LV Monitoring** soft key again. The system will display the live scan.

To re-enter quad FlexiView:

- While in the single view FlexiView, press the **LV Monitoring** soft key.

To exit FlexiView:

- Select a preset other than OR in the *Select Probe and Application* screen.

OB Package

NOTE: The OB applications are only available when the Convex C358 probe is connected.

Operating the OB Package

The general operation is similar to that of the Cardiac Package. Refer to *Chapter 6, Cardiac Measurement and Analysis* in the User's Manual for detailed operating instructions.

Patient Details

When an OB application is selected, the *Main Details* page of the *Patient Details* screen is modified to include:

- LMP
- EGA

NOTE: If the **Application Type** field in the *Patient Details* screen is not **OB**, due to a different, prior procedure or application, TRACKBALL to **OB** in the dropdown list and press **Select.**

Performing an Obstetric Evaluation

1. Insert the Convex C358 probe into an available port.
2. Press **Probe**.
3. TRACKBALL to the appropriate OB application preset and press **Select**.

It is now possible to use either the **Caliper** (Measure, or Measure and Assign methods) or **Measure** (Assign and Measure method) buttons to perform measurements.

Measurements are accumulated in the database. These measurements can be viewed and edited in a Worksheet, and displayed in the on-screen Mini-Report.

On-Screen OB Mini-Report

Each measurement made and assigned to a parameter will appear in a condensed on-screen Mini-Report in the upper-right corner of the image.

During scanning, this on-screen Mini-Report is not displayed. The Mini-Report is redisplayed when the **Caliper** or **Measure** buttons are pressed.

Measurement Tools

2D Caliper

1. Generate the image to be measured and press **Freeze**.
2. Press **Caliper**.
3. Press the **2D Caliper** soft key.
4. TRACKBALL to the start point of the measurement and press **Select** to anchor the caliper.
5. TRACKBALL to the measurement end point.
6. Press **Select** to anchor the caliper.
7. Repeat steps 4 – 6 for additional measurements.
8. Assign labels to the measurements as described in the Assigning a Parameter Label After Measurement on page 39.

Ellipse Tool

1. Generate the image to be measured and press **Freeze**.
2. Press **Caliper**.
3. Press the **Ellipse** soft key.
4. TRACKBALL to the start point for the circumference measurement and press **Select** to anchor the caliper.
5. TRACKBALL to adjust the major axis until an ellipse of the required shape and size is obtained, then press **Select** to anchor the second caliper. The third and fourth calipers are displayed along the minor axis, enabling the user to further adjust the shape and size of the ellipse.
6. To adjust the size of the ellipse, TRACKBALL to the appropriate caliper and press **Select**. TRACKBALL the caliper to the required location and press **Select** to anchor the position.
7. Repeat steps 4 – 6 for additional measurements.
8. Assign labels to the measurements.

Heart Rate (HR) Measurement Tool

1. Select an image to be measured and press **Freeze**, or retrieve a cineloop from the archive.
2. Press **Caliper**.
3. Press the **HR** soft key.
4. Press the **Cine Scroll/Run Cine** soft key rotary to activate and highlight the corresponding on-screen Run Cine soft key icon.
5. Press **Active Mode** twice to display the Cine soft key menu.
6. Use the **First Marker** and/or **End Marker** soft key rotaries to adjust the markers.
7. After positioning the markers correctly, TRACKBALL to the green checkmark next to the heart rate in the upper-left corner of the screen and press **Select**.
   OR
   To reject and cancel the measurement, TRACKBALL to the red “X” and press **Select**.

To perform a heart rate measurement in M-Mode or Doppler mode:

1. Select an image to be measured and press **Freeze**, or retrieve an image from the archive containing an M-Mode scan or Doppler spectrum.
2. Press **Caliper**.
3. Press the **HR** soft key.
4. Use the **First Marker** and/or **End Marker** soft rotaries to position the markers to mark a single, complete heart cycle.
5. After positioning the markers correctly, TRACKBALL to the green checkmark next to the heart rate in the upper-left corner of the screen and press **Select**.
   OR
   To reject and cancel the measurement, TRACKBALL to the red "X" and press **Select**.

M Caliper Measurement Tool

1. Select the image to be measured and press **Freeze**.
2. Press **Caliper**.
3. Press the **M Caliper** soft key.
4. TRACKBALL to the start point of the measurement and press **Select**.
5. TRACKBALL to the measurement end point and press **Select**.
6. Repeat steps 4 – 5 for additional measurements.
7. Assign labels to the measurements.

PS & ED Tool

1. Generate the spectrum to be measured and press **Freeze**.
2. Press **Caliper**.
3. Press the **PS & ED** soft key.
4. TRACKBALL the cursor to the peak systolic point of the spectrum and press **Select** to anchor the caliper.
5. TRACKBALL the second caliper to the end diastolic point on the spectrum.
6. Press **Select** to anchor the caliper.

NOTE: The order in which the two velocities are measured is not important for PS, ED, RI, and S/D. The larger velocity will always be assigned to Vps and the smaller velocity to Ved. The Acc and AT will be calculated only when the smaller velocity is measured first.

7. Repeat steps 4 – 6 to make additional measurements.
8. Assign labels to the measurements.

Velocity Tool

1. Generate the spectrum to be measured and press **Freeze**.
2. Press **Caliper**.
3. Press the **Velocity** soft key.
4. TRACKBALL to the point of measurement for the velocity on the spectrum.
5. To make another measurement, press **Select** to anchor the caliper.
6. Repeat steps 4 – 6 for any additional measurements.
7. Assign labels to the measurements.

Automatic Trace Tool

To perform an automatic spectrum trace to measure the PI & RI

1. Generate the spectrum to be measured and press **Freeze**.
2. Press **Caliper**.
3. Press the **Auto Trace/Man Trace** soft key so that **Auto Trace** is highlighted.
4. TRACKBALL to any time position over the required heart cycle on the spectrum.
5. Press **Select**.
6. Repeat steps 4 – 5 to make additional measurements.
7. Assign labels to the measurements.

NOTE: Autotrace may also be used while in Doppler Mode.

Manual Trace Tool

To take a manual spectrum trace to measure the PI & RI:

1. Generate the spectrum to be measured and press **Freeze**.
2. Press **Caliper**.
3. Press the **Auto Trace/Man Trace** soft key twice so that **Man Trace** is highlighted.
4. TRACKBALL to the start point of the spectrum trace. Start on the left and trace to the right.
5. Press **Select** to anchor the caliper.
6. Use the TRACKBALL to trace the peak envelope of the spectrum.
7. Press **Select** to anchor the caliper.
8. Repeat steps 4 – 7 to make additional measurements.
9. Assign labels to the measurements.

OB Twins Measurement Tool

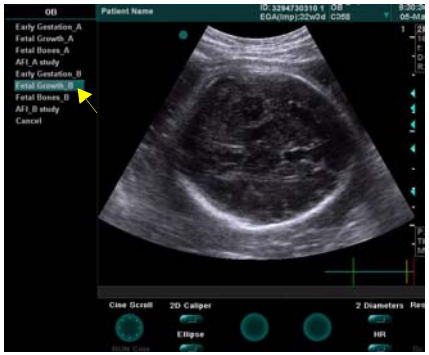
The OB Twins Preset enables the measurement of twins. When performing an OB examination, all parameters for each fetus are clearly identified and labelled (and saved) as "**A**" and "**B**".

For more details, refer to the **Vivid 3 Release Notes SW 3.1**

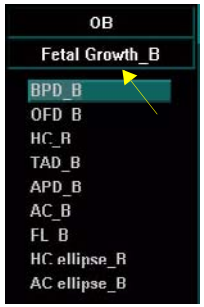
To activate the OB Twins measurement option:

1. Select the **OB Twins** preset (as shown below):

2. Trackball to the pre-defined list of measurement options (*left* side of the screen) and make the appropriate selection in order to perform the required measurement. For example, **Fetal_Growth_B** (as shown below):

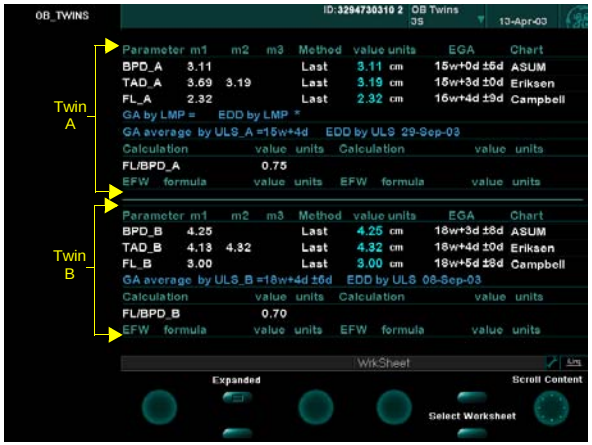


3. From the list of pre-defined Fetal Growth_B measurements displayed, select the required item. For example, **BPD_B**.



4. Perform the selected measurement, using the cursor displayed on the screen.

*NOTE: In the worksheet, displayed measurements and parameters for Twin **A** and Twin **B** are clearly separated by a thick horizontal line, as shown in the example below.*


OB_TWINS
Twin A
Twin B
Parameter m1 m2 m3 Method value units EGA Chart
BPD_A 3.11 Last 3.11 cm 15w+0d ±6d ASUM
TAD_A 3.69 3.19 Last 3.19 cm 15w+3d ±0d Eriksen
FL_A 2.32 Last 2.32 cm 16w+4d ±9d Campbell
GA by LMP = EDD by LMP
GA average by ULS_A =15w+4d EDD by ULS 29-Sep-03
Calculation value units Calculation value units
FL/BPD_A 0.75
EFW formula value units EFW formula value units
Parameter m1 m2 m3 Method value units EGA Chart
BPD_B 4.25 Last 4.25 cm 18w+3d ±8d ASUM
TAD_B 4.13 4.32 Last 4.32 cm 18w+4d ±0d Eriksen
FL_B 3.00 Last 3.00 cm 18w+5d ±9d Campbell
GA average by ULS_B =18w+4d ±6d EDD by ULS 08-Sep-03
Calculation value units Calculation value units
FL/BPD_B 0.70
EFW formula value units EFW formula value units
WrkSheet
Expanded
Scroll Content
Select Worksheet

OB Graphs Tool

The OB Graphs option is used to estimate fetal growth and development against pre-defined standards - according to gestational age. For more details, refer to the **Vivid 3 Release Notes SW 3.1**

You may select the appropriate chart against which to make a comparison (for example, *Hadlock*, *Jeanty*, *etc*.) from a collection of charts.

To activate the OB graphs option:

1. Press **Worksheet** on the control console.
2. Position the cursor on **EGA** and press **Select**.

A chart is displayed (as shown below), depicting the fetal measurements in comparison to standard measurement values at the same gestational age, according to the selected author (*Jeanty in this example*).

NOTE: The actual fetal measurement is marked with an X on a vertical dotted blue line (representing age in weeks). This can be visually compared with the blue line on the graph (according Jeanty) which is bounded on either side by the standard deviation limits (pink lines). The measurement and name of the chart is displayed in the top left corner, together with the gestational age.

NOTE: You may store the graph as an archived image and then print it, or implement it in a report.

3. Press **Freeze** or **Select** to return to the Worksheet.

   NOTE: If a different chart author is selected on the worksheet, the OB graph will update to show the graph of the newly-selected author.

4. After making all required comparisons, press **Select** on the control console to continue with the exam in the normal manner.

Worksheet

- Press **Worksheet**.

Adjusting the Method by Which a Calculation is Made

To adjust the method by which a calculation is made:

1. TRACKBALL to the relevant cell in the **Method** column and press **Select**.
   The following options are available:
   - Min
   - Max
   - Last
   - Aver
2. TRACKBALL to the required option and press **Select**.

NOTE: The selection of the chart will be retained by the system until manually changed.

Adjusting the Chart by Which a Calculation is Made

To adjust the chart by which a calculation is made:

1. TRACKBALL to the relevant cell in the **Chart** column and press **Select**.
2. TRACKBALL to the required chart/author and press **Select**.

NOTE: The selected chart will remain in the system until it is manually changed by the user.

Including or Excluding Values in a Calculation

To mark a value for inclusion/exclusion in a calculation:

- TRACKBALL to the measurement that is to be included/excluded from the calculation, and press **Select** to toggle the value to be included or excluded.

NOTE: An excluded measurement changes color to signify that its value has not been included in the calculation. The value in the **Value** *field is adjusted accordingly.*

Manually Changing a Value

To manually change a value:

1. TRACKBALL to the value that is to be changed and press **Select**.
2. Use the alphanumeric keyboard to enter the required value. An asterisk indicates that the value has been manually altered.
3. Press **Select** again to continue the procedure.

Restoring Automatic Calculation

To restore automatic calculation:

- TRACKBALL to the asterisk, and press **Select**. The manual entered value is replaced by an automatically calculated value.

GYN Package

The GYN Package enables the user to measure various ovarian and uterine dimensions.

NOTE: The assignment of parameters to measurements and the different capabilities available when operating the studies are described in *Chapter 6, Cardiac Measurement and Analysis* of the User's Manual.

Fetal Heart Evaluation

The Fetal Heart Package enables the user to measure and calculate fetal heart parameters using the standard cardiac measurement and analysis tools, measurements and working procedures.

For additional information, refer to *Chapter 6, Cardiac Measurement and Analysis* of the User's Manual.

Abdominal Evaluation

The Abdominal Package enables the user to perform various abdominal organ parameters.

NOTE: The assignment of parameters to measurements and the different capabilities available when operating the studies are described in *Chapter 6, Cardiac Measurement and Analysis* of the User's Manual.

Hip Joint Measurement and Analysis

The Hip Joint Measurements package is a useful diagnostic aid for assessing the development of the infant hip. This provides two measurement tools for performing the following measurements:

- Hip Joint Angles
- Diameter Ratio

Note: All hip joint measurements automatically appear in the worksheet and in the Hip Joint Report.

For additional information, see the **Vivid 3 Release Notes SW 3.1**.

To perform Hip joint measurements:

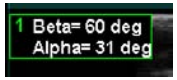
1. From the Presets menu (Small Parts), select **Hip Joint**.
2. Freeze the image and press **Caliper** on the control console.
   The **Hip Joint** soft rotary is displayed below the scanning screen:

3. Click on the scanning screen to draw the first line (**Base Line**) - see illustration.

   Drag the line into the required position, using the **Rotate Line** rotary key on the soft menu to rotate it if necessary.

   Press **Select** to fix the line in position; the second line will automatically appear.
4. Move the second line (**Labrum Acetabular**) and drag it into the appropriate position, using the rotary key to rotate it as necessary. Press **Select** to fix the line in position; the angle between the two lines (α) is displayed.
5. Move the third line (**Roof Line**) and drag it into position, rotating it as necessary. Press **Select** to fix the line in position; the ß (Beta) angle is displayed.

*NOTE: By default, the line names are displayed. If preferred the names may be hidden - for details, see **Vivid 3 Release Notes SW 3.1**.*

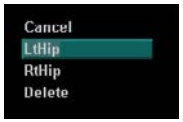


The measurement of the angles (degrees) between the lines is automatically calculated and displayed in a results box at the top of the screen, together with the measurement number - for example, 1 as shown here.

NOTE: Measurements may be assigned to either the Left or Right hip, as described below.

6. If you wish to assign the measurements to the *Left* or *Right* hip, trackball to the results box (the cursor becomes hand-shaped) and right-click.

   A drop-down menu open on the left of the screen.



7. Choose the required hip and press **Select**.

   The measurements are assigned to the selection and will be displayed accordingly, both on the screen and in the worksheet (see example below).

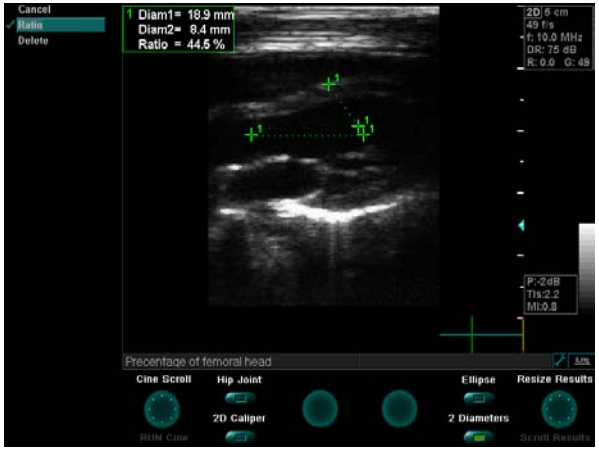
NOTE: Pressing Cancel on the drop-down menu, cancels the currently-selected line; Delete removes the entire measurement (all three lines).

8. Repeat Step 3 through Step 7 for any additional measurements, as required. These will be displayed on the screen accordingly.

To assign a ratio to a Hip joint measurement:

1. Freeze the image and press **Caliper**.
2. Select the **2 Diameter** soft key (“Circumference”).
3. Measure the following distances, in any order:
   - Between the baseline and the medial point on the femoral head
   - Between the labrum acetabulare and the medial point on the femoral head

   The two distances will appear as *Diam1* and *Diam2*, as shown in the example below:



4. Trackball to the Results box (the cursor now becomes hand-shaped).
5. Press the **Menu** button on the keyboard.
6. Select **Ratio** on the drop-down menu on the left area of the screen.

   The ratio will be calculated and displayed (as seen above). This ratio indicates the percentage of coverage of the femoral head.

The same ratio will also appear in the worksheet result page.

Reporting

For additional information, see *Chapter 9, Reporting* in the User's Manual.

Creating Reports

To generate a report:

- Press **Report**.

Editing Reports

To edit a report:

1. Press **Report**.
2. TRACKBALL to the report on the screen and press **Menu**. An asterisk is displayed to the left of the presently selected and displayed template.

*NOTE: Instead of pressing Menu, you may use the **Template** soft key, for easy access to the complete list of report templates available.*

NOTE: For details about configuring alternative report templates, refer to the Stress Tab and Report Tab sections in Chapter 14, Presets and System Setup of the User's Manual.

3. TRACKBALL to an alternative template, if required, and press **Select** to highlight the template.
4. The report headings, such as **Name**, **ID**, **Birth Date**, **Indications,** and **Comments** are highlighted in green, and hyperlinked to facilitate editing.
   - TRACKBALL to such a heading and press **Select**.
   - Press **OK** or **Cancel** to return to the report after editing is complete.

NOTE: In any reports, all light green fields are hyperlinked. Double-clicking such a field will take you to the original source field, where modifications may be made if necessary.

5. Press the **Save** soft key.
6. Use the alphanumeric keyboard to enter a name for the new report in the dialog box.

NOTE: The system will automatically add the exam date (DDMMMYY) as an extension of the saved report name given by the user to assure easy and improved identification.

7. TRACKBALL to **OK** and press **Select** to save the report.
8. Press **Report** on the control panel to exit the report and return to the current patient's scanning screen.

Including Images in Reports

To add/replace images in a report:

1. Press **Report**.
2. TRACKBALL to the report on the screen and press **Menu**.
3. TRACKBALL to an alternative template layout that includes image fields and press **Select** to highlight the template.
4. TRACKBALL to the required image in the clipboard and press **Select**. A yellow frame indicates that the image has been selected.
5. Simultaneously press **Select** and TRACKBALL the yellow framed image to the required location in the report template. When **Select** is released, the image is placed and displayed in the selected location.

Important: The user must save the report in order to be able to view the report at a later time with the images as placed. Once a report is saved, no data or image can be added to the same report.

Deleting Images From Reports

The option to erase images from a report and "populate" it with new images, is provided.

To delete images from a report:

1. Trackball to the image area corresponding to the image you wish to erase from the report.
2. Press **Menu** on the control console.
3. A pop-up menu is displayed, as shown below:

NOTE: The illustration above shows only one image from a collection of images in the Report.

4. Select **Clear Image** to erase the currently-selected image from the report. Alternatively, select **Clear All Images** to remove all images from the report.
5. If necessary, use the drag-and-drop method to "re-populate" the report with the required images.

Printing Reports

To print a report:

NOTE: The report is printed only to an externally connected printer.

- Press the **PC Print** soft key.

Installing A New Report Template

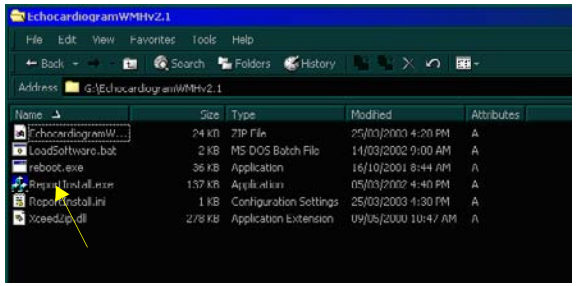
NOTE: The CD containing one or more new Report templates is your source for installing the new templates into the Vivid 3 system.

To install a report template:

1. Insert the CD into the CD-ROM drive on the Vivid 3 system.
2. While in scanning mode, press **Freeze** and then press **Trackball** on the control console until a cursor is displayed.
3. Press **Menu**. The following two options are displayed:

4. Select **Explore**.

   A Windows Explorer menu opens (by default, the U-drive is currently selected).
5. Browse to select the compact disk directory (**CD-ROM**).
6. Under the **Reports** files, select the required report template then double-click on **ReportInstall.exe** (refer to illustration).


EchocardiogramWMHv2.1
File Edit View Favorites Tools Help
Back Search Folders History
Address G:\EchocardiogramWMHv2.1
Name Size Type Modified Attributes
LoadSoftware.bat 2 KB MS DOS Batch File 14/03/2002 9:00 AM A
reboot.exe 36 KB Application 16/10/2001 8:44 AM A
ReportInstall.ini 1 KB Configuration Settings 25/03/2003 4:30 PM A
Xceed2d.dll 278 KB Application Extension 09/05/2000 10:47 AM A

   The selected report template is installed on the Vivid 3 system.

*NOTE: Whenever a new report template is installed on the system, it is added to the Users Report Templates list under the Report tab in the System Configuration window. For details, refer to the **Vivid 3 Release Notes SW 3.1**.*

NOTE: New report templates may not be modified on the Vivid 3 system. Any changes required may be made using the Report Designer.

Retrieving Saved Reports

To retrieve and view an archived report:

1. Press **Archive**.
2. Use the **Select Patient** soft key rotary to scroll through the list and highlight the required patient.
3. Press **Report**.
4. Press the **Archived Reports** soft key.
5. Use the **Select Report** soft key rotary to select the required report.
6. Press **Report** to exit.

NOTE: Saved reports are read-only.

Patient Management and Archiving

For additional information, see *Chapter 10, Patient Management and Archiving* in the User's Manual.

Archiving Package (option)

The Archiving Package enables the user to permanently store images and cineloops, as well as patient measurements and reports.

Important: Without the Archiving Package, the data is only stored for the duration of the current examination.

A system message informs the user if the archived patient information is currently in use.

NOTE: In addition, the Archiving Package provides the ability to generate and export a list of patients, in Microsoft Excel format (see page 57). The exported list provides a summary of demographic details pertaining to patient exams performed on the system for a specific period, as selected by the user.

Beginning an Exam on an Archived Patient

To locate a patient record in the archive:

1. Press **Patient ID**.
2. TRACKBALL to **Start New Patient** and press **Select**.
3. Press the **Search Patient** soft key.
4. Search, scrolling using the **Select Patient** soft key rotary.
5. After locating and highlighting the required patient, press **Select**.
6. Edit the patient information as required.
7. Press the **OK** soft key.
8. If the patient record cannot be located (indicating that no previous record exists):
   - Press the **Cancel** soft key.
   - Press the **Begin Exam** soft key.

Archiving/Storing Images and Cineloops

When an image is stored, all the additional information that is displayed, such as the probe application and image settings, is saved with it.

Annotations or measurements that are marked on the screen are also stored with the image. When a split screen image is stored, it is stored exactly as displayed on the screen.

The stored images and cineloops are displayed as thumbnails on the clipboard as shown below.

- A filmstrip icon is displayed in the bottom left corner of each cineloop thumbnail.
- A split screen icon is displayed in the bottom left corner of each side-by-side thumbnail.

NOTE: To enable measurements to be made on images recorded on VCR, the **M&A on VCR** *option must be selected in the configuration setup. For further information, refer to Chapter 14, Presets and System Setup of the User's Manual. In addition to the archive, images and cineloops can also be backed up on MOD (Magnetic Optical Disks) or CD-Rs.*

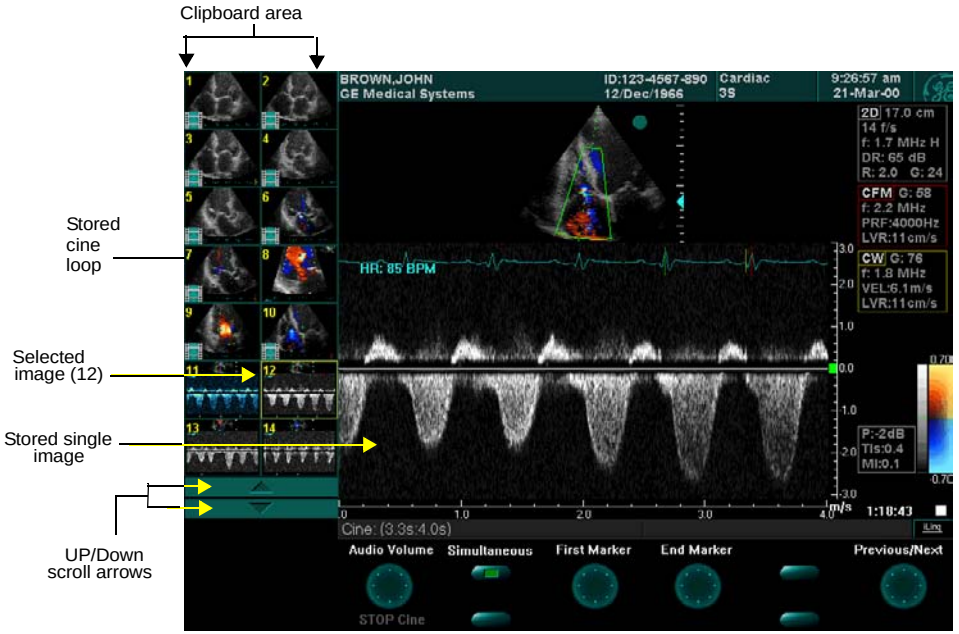


Figure 21: Stored Images and Cineloops Screen

Storing an Image

To store an image in the archive:

1. While scanning in any mode, press **Freeze** to freeze the image.
2. TRACKBALL through the cineloop to select the required image.
3. Press **Store**. The image is saved in the archive and a thumbnail is displayed on the clipboard.

Storing a Split Screen Image

To store a split screen image:

1. While scanning in any mode, press **1/2/4** button, once to split the screen into two windows, or twice to split the screen into four windows.
2. Continue scanning as described in the *Working in Split Screen Mode* section in *Chapter 3, Modes* in the User's Manual to select the required image or cineloop in each of the windows.
3. Press **Store**.

Storing a Cineloop

To preview and then store a cineloop:

1. While scanning in any mode, press **Freeze** to freeze the image.
2. Press the **Cine Run** soft key rotary.
3. Determine the best cineloop to store. Use the soft keys (**Prev/Next**,**First**, **End Marker** and so on)
4. Press **Store**.

*NOTE: You may also press **Store** twice (to accept loops) without performing Steps 1 -3 above.*

Viewing Stored Images and Cineloops

To view a stored image:

- TRACKBALL to the required thumbnail image on the clipboard and press **Select**.

To view a stored split screen image:

1. TRACKBALL to the required thumbnail image on the clipboard and press **Select**.
2. Press **Window Select** to highlight the side of the image that is to be displayed as a full size image.
3. Press **1/2/4** until the image is displayed as a full size image.

To view a stored cineloop:

- TRACKBALL to the required thumbnail image with a filmstrip icon on the clipboard and press **Select**.

Retrieving and Editing Archived Information

Editing Patient Data in the Archive

To search for a patient:

1. Press the **Patient ID** button on the control panel. The Select screen is displayed.
2. TRACKBALL to the on-screen Search button and click **Search**. The Patient List screen is displayed.

To retrieve archived patient data/information:

1. Press **Archive**.
2. Search the *Patient List* screen by scrolling through the list using the **Select Patient** soft key rotary.
3. Press the **Edit** soft key.
4. Use the **Select Page** soft key rotary to scroll between patient information.

NOTE: The information is examination-specific. It may differ between examinations. Therefore, the patient information for each examination can be edited as required.

To edit archived patient information:

1. Using the alphanumeric keyboard, add and/or edit any information.
2. Press the **OK** soft key to save all editing changes or press the **Cancel** soft key to ignore all changes.

NOTE: At any time during the procedure:

- Press **Exit** or **Freeze** to return to current patient's scanning screen.
- Press the **Edit** soft key to redisplay the selected patient's Main Details pages.
- Press the **Patient List** soft key to redisplay the archived *Patient List.*

To retrieve and/or edit an archived examination:

1. Press **Archive**.
2. Search the *Patient List* screen by scrolling through the list using the **Select Patient** soft key rotary.
3. Press the **Exam List** soft key.

NOTE: The images on the most recent examination are displayed on the clipboard.

4. Scroll through the exam list using the **Select Exam** soft key rotary.
5. Press the **Edit** soft key.
6. Edit the test as required, using the **Select Page** and **Select Field** soft key rotaries.
7. Press the **OK** soft key to save all changes
   OR
   Press **Cancel** to ignore all changes.

To retrieve and/or edit an archived image:

1. Enter the archive and select the required patient and examination.
2. TRACKBALL to the required image on the clipboard and press **Select**.

Important: If the selected image displays measurements and annotations, press the **Remove Overlay** soft key to remove all annotations and measurements

3. Press **Measure** or **Caliper** and make the required measurements and annotations.
4. Press **Store**.

To retrieve a stress examination:

1. Press **Archive**.
2. Using the **Select Patient** soft key rotary, select the required patient record that includes the stored stress examinations.

*NOTE: **Protocol** is enabled and its label is lit only for patient records that include stored stress examinations.*

3. Press **Protocol**.
4. Perform the stress analysis again, as required. Refer to *Chapter 5, Stress Echo* in the User's Manual for further information.
5. Press **Protocol** again to exit the examination, saving all scoring and analysis, and to return to the current patient's scanning screen.

To retrieve and/or edit a Worksheet:

1. Press **Archive**.
2. Using the **Select Patient** soft key rotary, select the required patient record.
3. Press **Worksheet**.
4. Using the alphanumeric keyboard, edit the values as required.
5. Press **Worksheet** again to return to the current patient screen.

Redisplaying the Clipboard

To redisplay the clipboard and its images:

- TRACKBALL over the clipboard area. The thumbnail images are redisplayed.

Deleting Archived Information

To delete a patient record:

1. Press **Archive**.
2. Use the **Select Patient** soft key rotary to highlight the patient record to be deleted.
3. Press the **Delete** soft key. A pop-up dialog box is displayed.
4. TRACKBALL to **Yes** and press **Select**.

NOTE: The current patient record and examination cannot be deleted.

To delete a group of patient records:

1. Press **Archive**.
2. Press the **Select Patients** soft key rotary to select the first patient record in the group of records that is to be deleted, and continue scrolling with the rotary to highlight the group.
3. Press the **Select Patients** soft key rotary again to indicate that the group is complete.

NOTE: The selection process can be cancelled by centering the TRACKBALL *on the list and pressing* **Select**.

4. Press the **Delete** soft key. A pop-up dialog box is displayed.
5. TRACKBALL to **Yes** and press **Select**.

NOTE: The current patient record and examination cannot be deleted.

To delete an image:

1. Press **Archive**.
2. Select a patient record and examination.
3. Use the TRACKBALL to place the arrow cursor over the image that is to be deleted.
4. Press **Menu**. A pop-up menu is displayed.
5. Using the TRACKBALL, select **Delete** and press **Select**.

To delete an examination:

1. Press **Archive**.
2. Select a patient record.
3. Press the **Exam List** soft key.
4. Using the TRACKBALL, highlight the examination that is to be deleted.
5. Press the **Delete** soft key.
6. TRACKBALL to **Yes** and press **Select**.

Additional Archived Information and Data

To access additional database information:

1. Press **Archive**.
2. Press the **Utilities** soft key. This displays the database inventory, including the number of patient records, examinations, and images stored. It also indicates the volume of free space still available for archiving.

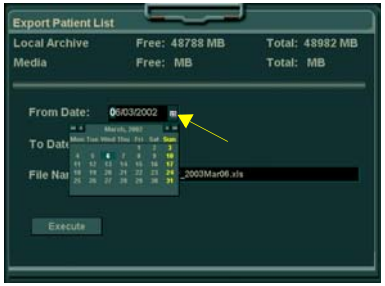
   Other diverse data information includes:
   - Personnel List
   - Removable Media Utility
   - Patient List
   - Backup

Exporting the Patient List to Excel

To export the patient list to Excel:

1. Press the **Archive** button on the control console. The *Patient List* window is displayed.
2. Press the soft rotary key enabling the **Utilities** function. A General Status screen with a pie chart is displayed.
3. Toggle the **Summary/Status** soft rotary key once. The Export Patient List is displayed, as shown below:

4. Trackball to the **From Date** field and click the arrow (as shown below) to access the calendar:



   Using the scroll arrows provided, select the required starting date; the selected date is displayed in the *From Date* field.
5. In the **To Date** field below, repeat Step 4 to select the required ending date; the selected date is displayed in the *To Date* field.

NOTE: By default, the date initially displayed in the To Date field is the current date, and the From Date is one year earlier.

6. In the **File Name** field, if required type over the default file name to rename the file, as appropriate.

Note: The file automatically has an Excel file extension (.xls).

7. Trackball to the **Execute** button below and press **Select**.

   The file is exported to the directory that was defined in System Configuration (Archive Tab) - refer to the **Vivid 3 Release Notes SW 3.1**.

   The exported demographic data includes the following:
   - Patient Last Name
   - Patient First Name
   - Patient ID number
   - Exam Date
   - Many other exam details

Backup Procedures

The Backup procedure backs up patient details, M&A data, stress data, images (in raw data format) and reports (in CHM format) to the local MOD or CD-R archive. The System archive should be backed up regularly.

NOTE: The smallest entity in the backup procedure is a single examination.

NOTE: The Patient Archive directory file is backed up on every media that is used for backup. Therefore, the newest media holds the most updated Patient Archive directory file.

The system is unavailable for use while images and data are being backed up. The backup procedure time depends on the amount of data being backed up. The backup process can be stopped at any time and continued at any time.

Important: The patient archive should be backed up regularly. A weekly Backup is strongly recommended.

Important: An on-screen **Repeat Backup** button is provided in case the first backup media was damaged. The previously backed up exams will be re-backed up on to the new media.

Scheduling a Backup

To schedule a backup:

1. Press **Archive**.
2. Press the **Utilities** soft key.
3. Press the **Backup** soft key.
4. TRACKBALL to and **Select** the desired timing from the dropdown list in the **Backup Frequency** text box. (The user can manually adjust the date displayed in the **Next Backup Date** text box.) The system will prompt the user to perform the Backup procedure at the scheduled time.

Performing a Backup

To perform a backup:

1. Perform steps 1 – 3 of the procedure for scheduling a backup in *Chapter 9, Reporting* in the User's Manual.
2. TRACKBALL to **Incremental Backup** and press **Select**. The system will prompt to insert a backup disk. If needed, follow mount, format and label procedures in 'Disk Formatting and Labeling" on page 59.
3. TRACKBALL to **OK** and press **Select** when the correct disk is mounted and ready. The system will redisplay the Backup screen and begin the Backup process.

Interrupting the Backup Process

To stop the backup process:

1. Perform steps 1 – 3 of the procedure for scheduling a backup in 'Scheduling a Backup" on page 58.
2. TRACKBALL to **Stop current action** and press **Select**. The Backup process is stopped.

Important: Any exams on the hard disk that were only partially backed up due to the (previous) interrupted Backup process will also be backed up.

Performing a Repeat Backup

In the event that the first backup media has become damaged or mislaid, the ability to repeat a backup is available. This feature (on-screen button) is provided in the *Backup* screen options.

To perform a repeat backup:

1. TRACKBALL to the on-screen **Repeat Backup** button, and press **Select**. A box will open permitting label name entry of media to be duplicated.
2. Using the alphanumeric keyboard, type in the label name of the media to be duplicated - for example, Disk 20.

   IMPORTANT - the ***identical*** label name must be typed (i.e. exactly the same label name as that of the damaged back-up media).
3. When prompted, type a **new** label name - for example, Disk 30 (the system will require a *new*, *unique* name).

   The system will repeat the backup process to the new media (in the example above, to *Disk 30*).

Purging Backed Up Exams

Purging data frees space in the unit's archive. Only backed up data can be purged.

The purge function will be activated automatically by the system when the occupied space on the disk increases slightly above 13 GB. The system will automatically remove the oldest backed up exams when:

- The user presses **Patient ID**.
- The user performs a Backup procedure.
- The user deletes patients from the Patient List.
- The system enters standby mode.

NOTE: All patient records remain in the archived Patient List.

NOTE: If the thumbnail images on the clipboard on the left side of the screen appear only as graphic overlays or icons, it means that the exam was already backed up and purged from the system's internal hard disk.

To restore purged images and reports:

1. Press **Archive**.
2. Using the **Select Patient** soft key rotary, scroll through the list and highlight the required patient record.
3. TRACKBALL and highlight the required examination and press **Menu**.
4. TRACKBALL to **Restore this Exam** from Backup and press **Select**. The system will display a message prompting the user to mount and insert the specific backup media containing the desired exam and/or image. Once the media is inserted, the image and all other relevant data of the exam from the media will automatically be restored to the archive, and can be manipulated manually.

Important: The originally backed up data will remain unmodified on the backup media.

Exporting Images and Reports to External Media

To export an image or a loop to an external media:

1. TRACKBALL to the required image or loop icon on the clipboard.
2. Press **Menu**.
3. TRACKBALL to **Save As** and press **Select**.
4. TRACKBALL to the required media in the **Save In** field box and press **Select**.
5. TRACKBALL to one of the available formats in the **Save as type:** field and press **Select**.
6. Using the alphanumeric keyboard, type the file name into the **File name** field.
7. TRACKBALL to **Save** and press **Select**.

To export a report to an external media:

1. Generate a report using the normal procedures, as described in *Chapter 10, Patient Management and Archiving* in the User's Manual.
2. Press the **Save As** soft key rotary.
3. TRACKBALL to the required media in the **Save In** field and press **Select**.
4. Verify that **CHM files** or **PDF files** format is displayed in the **Save as type** field.
5. Type the file name into the **File name** field.
6. TRACKBALL to **Save** and press **Select**.

NOTE: CHM format can only be read by Windows Explorer Version 4 or higher.

Disk Formatting and Labeling

To access the Removable Media Utility screen:

1. Press **Archive**.
2. Press the **Utilities** soft key.
3. Press the **Removable Media Utility** soft key.

NOTE: Alternatively, press **<Ctrl>** *and* **<M>** *on the alphanumeric keyboard to access this screen.*

The media can be ejected at any time during normal workflow by the simplified procedure: **<Ctrl>** and **<E> [Eject]**.

To mount a disk:

1. Insert the disk in the appropriate drive.
2. Perform the above procedure for accessing the Removable Media Utility screen.
3. TRACKBALL to **Mount** and press **Select**.

If the new disk is not labeled, format it as described below:

To format a new disk:

1. Mount the disk as described above.
2. Type a label in the **Media Label** field.
3. TRACKBALL to **Format** and press **Select**.

To rename or recycle a disk:

Important: Only MOD can be renamed and recycled. CD-R disks can only be formatted once.

1. Mount the disk as described in 'To mount a disk:" on page 59.
2. Type a label in the **Media Label** field.
3. TRACKBALL to **Format** and press **Select**. The system will reformat the disk, erasing all of its contents and renaming the disk.

NOTE: When a CD is ejected, it is automatically finalized.

Connectivity

For additional information, see *Chapter 11, Connectivity* in the User's Manual.

When the user selects a dataflow, the unit's input and output devices are automatically configured according to the selected dataflow.

Important: The system's default dataflow is **Local Archive - Int.HD.**

Dataflow Table Legend:

- Local Archive = Ultrasound unit's Echo Database 3.0 Archive
- Int. HD = Ultrasound unit's Internal Hard Drive
- Remote Archive or Storage = EchoPac workstation or EchoServer
- *Local Archive - Int. HD*: Item/s to the left of the dash in a dataflow (e.g. Local Archive) is the INPUT SOURCE; item/s to the right of the dash (e.g., Int. HD) is the DESTINATION (archive).
- *Local Archive - Int. HD + CDR*: When a plus sign (+) appears within dataflow: there are more than 1 input source/s or destination archive/s (e.g. 2 destinations: Internal Hard Drive and CDR).

NOTE: The user can view and check the dataflow currently in use in the System Configuration window's **Connectivity** *tab.*

Selecting a Dataflow when Logging On

To select a dataflow when logging on:

1. Simultaneously press **<Ctrl>** + **<U>**.
2. TRACKBALL to the required dataflow in the Dataflow drop-down list and press **Select**.
3. TRACKBALL to **OK** and press **Select**.

Selecting a Dataflow During an Examination

To select a dataflow during an examination:

1. Press **Archive**.
2. TRACKBALL to the required dataflow in the drop-down list in the bottom-left corner of the screen and press **Select**.
3. Press **Archive**.

Important: A new patient must be created or selected in order to activate the newly selected dataflow.

Supported Dataflows

Basic Dataflows

Dataflow Name	Description
No Archive	An emergency dataflow used when no permanent storage is required. Current examination data is temporarily saved in the system's buffer. Once the examination has been terminated, no data will be saved. In order to permanently save the information, a different dataflow must be selected and data transferred using the *Patient Transfer* screen before the examination is terminated.
Local Archive - Int. HD	The default dataflow. The *Local Archive* (**Vivid 3 Pro/Vivid 3 Expert** ultrasound unit's Echo Database 3.0 archive/Int. HD) is used for storing all patient information. The ultrasound unit's Internal Hard Drive is used for patient archiving (including demographic data, M&A data), report, as well as image storage. With this type of dataflow, all images and patient information should be periodically stored on removable media for back up to free space in the local archive. For detailed back up procedures, refer to Chapter 10, *Back Up Procedures,* in the User's Manual.
Local Archive - Int.HD + MOD525 (DICOM)	Both the ultrasound unit's Internal Hard Drive and the MO disk are used for archiving patient demographic data and image storage. Reports and Worksheet data are stored to the Int.HD only. Images are stored in DICOM multi frame format (and as raw data, if configured by administrator) on the MOD.
Local Archive - Int.HD + CDR (DICOM)	Both the ultrasound unit's Internal Hard Drive and the CD are used for patient demographic data and image storage. Reports and Worksheet data are stored to the Int.HD only. Images are stored in DICOM multi frame format (and as raw data, if configured by administrator) on the CD.
Local Archive - MOD525 (Raw Data)	Patient demographic data, Worksheet data and reports are stored to both ultrasound unit's Internal Hard Drive and to MOD. Images, as raw data, are stored to MOD only.
Local Archive - CDR (Raw Data)	Patient demographic data, Worksheet data and reports are stored to both Int. HD and to CD. Images, as raw data, are stored to CD only.
Local Archive - Int.HD + MOD525 (Raw Data)	Both the ultrasound unit's Internal HD and MOD are used for patient demographic data, Worksheet data, report and image storage. Images are stored as raw data.
Local Archive - Int.HD + CDR (Raw Data)	Both the ultrasound unit's Internal HD and CD are used for patient demographic data, Worksheet data, report and image storage. Images are stored as raw data.

EchoNet Dataflows

Dataflow Name	Description
Remote Archive - Int. HD	A Remote Archive database, either a SonoPAC workstation or an EchoServer, is used for patient demographic and Worksheet data, and report storage. Images are only stored on the ultrasound unit's Internal Hard Drive.
Remote Archive - Remote Storage	Either a SonoPAC workstation or an EchoServer is used as the Remote Archive database; a Remote Storage (SonoPAC workstation or an EchoServer) is used for patient, report, and image storage.
Remote Archive - MOD525 (Raw Data)	Patients (demographic data, M&A data) and reports are stored both to a Remote Archive (a SonoPAC Workstation or an EchoServer) and to a MOD. Images, as raw data, are stored to MOD only.
Remote Archive - CDR (Raw-Data)	Patients (demographic data, M&A data) and reports are stored both to a Remote Archive (a SonoPAC Workstation or an EchoServer) and to a CD. Images, as raw data, are stored to CD only.

DICOM Network Dataflows

Dataflow Name	Description
Local Archive - Int. HD + DICOM Server	Both the ultrasound unit's Internal Hard Drive and the DICOM Server are used for archiving patient demographic data and image storage. Reports and Worksheet data are stored to the Int.HD only.
Remote Archive - Int. HD + DICOM Server	Either a SonoPAC workstation or an EchoServer is used as the remote archive database. Reports and Worksheet data are stored in the Int. Hard Drive. The Int. HD and a DICOM Server are used for patient demographic data and image storage.
Remote Archive - Remote Storage + DICOM Server	Either a SonoPAC workstation or an EchoServer is used as the Remote Archive database. Reports and Worksheet data are stored in the Remote Storage (SonoPAC workstation or an EchoServer). Demographic data and images are stored in both the DICOM Server and in the Remote Storage.
Modality Worklist + Local Archive - Int. HD + DICOM Server	A dataflow that searches the DICOM Modality Worklist (input source) for patient information, which is then copied to the local database. (The Local Archive database can also be an input database, but must be selected in *Patient List* screen.) The ultrasound unit's Int. HD is used for report and worksheet data storage. Images and patient demographic data are stored to both the Int. HD and the DICOM Server.
Modality Worklist + Remote Archive - Int. HD + DICOM Server	A dataflow that searches the DICOM Modality Worklist (input source) for patient information, which is then copied to the local database. (The Remote Archive database can also be an input database, but must be selected in *Patient List* screen.) The Remote Storage (SonoPAC workstation or an EchoServer) is used for patient demographic data, report and worksheet data storage. Images and patient demographic data are stored to both the Int. HD and the DICOM Server.
Modality Worklist + Remote Archive - Remote Storage + DICOM Server	A dataflow that searches the DICOM Modality Worklist (input source) for patient information, which is then copied to the local database. (The Remote Archive database can also be an input database, but must be selected in *Patient List* screen.) The Remote Storage (a SonoPAC workstation or an EchoServer) is used for worksheet data and report storage. Images and patient demographic data are stored to both the Remote Storage and the DICOM Server.

Supported Services

Services are the prime elements of a dataflow.

NOTE: The services associated with the System's dataflows cannot be configured by the user. A meeting of both the GE Service representative and the local IT personnel must be arranged for configuration.

The following services are supported by the System:

- Echo Database 3.0
- DICOM Media Creator
- DICOM Storage
- DICOM Storage Commitment
- DICOM Verification
- DICOM Modality Worklist
- DICOM Modality Perform Procedure Step (MPPS)

Exporting Data to DICOM Image Storage, DICOM Print, Media Storage, Excel, or MPEGVue

Data may be exported from the System to various configured services, including:

- DICOM Image Storage
- DICOM Print (see page 63)
- Media Storage
- Excel
- MPEGVue (see page 63)

NOTE: Multiple patient exams may be exported simultaneously to DICOM Image Storage or Media Storage services. However, when exporting to Excel, each exam must be exported individually.

To export one or more patient exams:

1. Press **Archive**.
2. Use the **Select Patient/Select Patients** soft key rotary and select the patient, or patients whose images are to be exported.
3. Press **Menu**.
4. TRACKBALL to the required option: **Export to DICOM Image Storage**, **Export to Media Storage,** or **Export to Excel**.

NOTE: Alternatively, if an Export short-cut key has been assigned, you may use this key - see the instructions described below.

5. Press **Select**.
6. TRACKBALL to **OK** and press **Select**.

Important: When exporting to Excel, the destination path to which the data will be sent must be assigned in the Archive Tab. When exporting to Excel, a dialog box will be displayed enabling the user to enter a name for the Excel file being created.

The default system generated file is:
Last Name_First Name_Birthdate (yyyy,mmm,dd)_Patient ID number.xls.

To activate the Export Shortcut:

*NOTE: Short-cut keys are assigned through the Archive Links tab in the System Configuration window - for details refer to the **Vivid 3 Release Notes SW 3.1**.*

1. When the current exam is finished and you wish to export it to another device, press the **Patient ID** button on the control console.
   The Select window is displayed:

2. If the required Export function is located on one of the soft-menu buttons (for example, **Excel Export** as seen above), simply click the button. The system will prompt for the next steps, accordingly.
3. If the requested Export function does not appear on any soft-key (has not been defined as a short-cut), just press **Cancel** and proceed with the normal export procedure (as explained on page 62).

The following is a list of export functions which may be assigned as short-cuts to any one of the four assignable soft-menu buttons:

- DICOM Print
- DICOM Storage Server
- DICOMVueCDR
- DICOMVueMOD525
- Excel Export
- MPEGVueCDR
- MPEGVueNET

Exporting Patient Exam (Images) to DICOM Print

NOTE: It is possible to export patient exam images (only) directly to a DICOM printer, by selecting patient files from the Patient List screen.

By choosing **Export to DICOM Print** from the drop-down menu (or using the export short-cut key, if assigned), images from the currently-selected patient files will be printed on the DICOM printer.

NOTE: Printing will be in accordance with the layout configured initially by the field service representative during system configuration.

NOTE: If required, you may print only one image on the DICOM printer (the currently-selected image). This feature (Print A or Print B on DICOM printer) is configured under the Printers tab in the System Configuration window.

Exporting Patient Exam to MPEGvue

The **Export to MPEGVue** feature provides the user with the ability to export an entire exam in MPEGVue format, (together with an embedded MPEG viewer) direct from the Patient List screen. The exported exam contains files in MPEG or JPG formats for all of the images in the exam. It also contains the measurements and reports generated during the exam. All of the exam's measurements are found in an Excel file, while the reports are all saved as files in .CHM format.

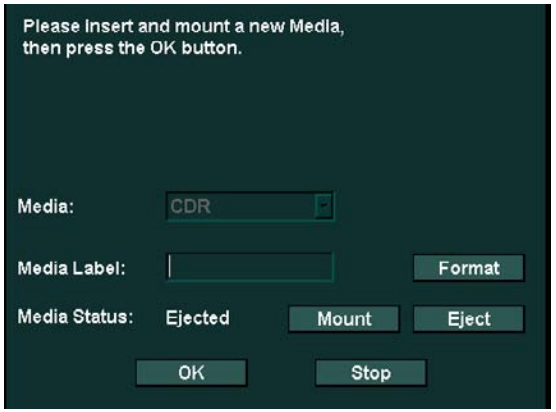
NOTE: The exported exam may be viewed on any PC operating on Windows 2000 and upwards. For details on configuring the system to enable export of patient data to MPEGVue, refer to the ***Vivid 3 Release Notes SW 3.1***

To export a Patient Exam to MPEGVue:

1. With the *Patient List* window displayed (at Exam/Patient level), select the required patient record(s).
2. Press the **Menu** button on the control console, or activate the short-cut key (if assigned - page 62).
3. From the drop-down list displayed, select **Export to MPEGVue**:

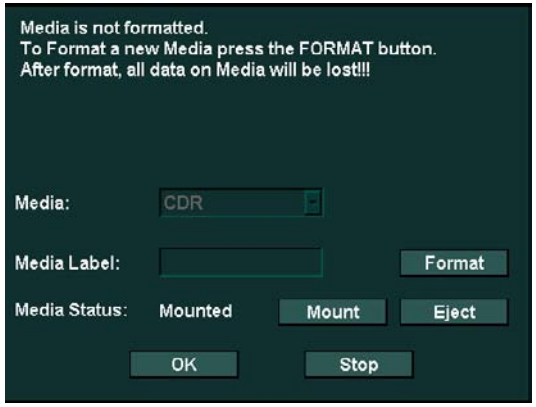
4. Select the required media - for example, **MPEGvueCDR** (or any other available destination media type, such as **MPEGvueNET**, **MPEGvueUSB**, etc.).

   The following dialog box opens (if MPEGvueCDR was selected) and the standard procedure for writing to CDR will commence:



5. Insert a blank CD into the CD-ROM drive, trackball to **Mount** and press **Select**.

   The message "*Please wait*" is displayed, then the following dialog box opens prompting the user to format the media (*including a warning that all data will be lost*):

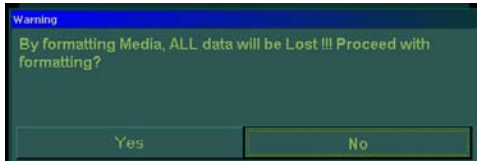


6. Name the media by typing a suitable name in the *Media Label* window.

*NOTE: You may use a maximum of 8 characters and type in upper or lower case letters. Do not use any special characters (for example, #, *, etc.)*

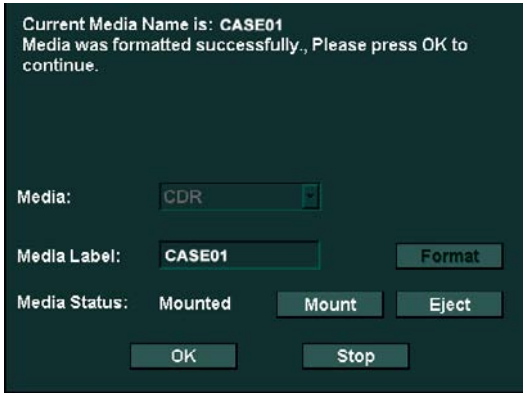
7. Trackball to **Format** and press **Select**.

   The following warning message is displayed:



8. Trackball to **Yes** and press **Select**.

   The media is formatted and the following message is displayed:



9. Trackball to **OK** and press **Select** to continue.

NOTE: Step 9 is the end of the CD preparation and the CD is now ready for writing of MPEGVue data to commence.

   The system exports the entire exam data from each of the currently-selected patient records to the selected media, together with an embedded MPEG viewer.

   During this process, the exam review progress is visible in the displayed sequence of preview screens; the time required for export will depend upon the amount of data; longer examinations will obviously require longer time.

   The progress status showing the percentage of completed exams (for example, done 60%) is displayed during the export process.

*NOTE: **While export is in progress, do not attempt to use the system**!*

   When export is complete, the following message is displayed:

NOTE: The CD finalization procedure is required only for MPEGVueCDR, and is the final part of the CD preparation operation.

*NOTE: If necessary, select any additional exams required by repeating Step 1 through Step 3 to add these to the media. A message is displayed prompting for verification that the same CD will be used for export of the selected exams. Click **OK** to confirm.*

NOTE: MPEGVue format is very compact and up to 50 exams may be recorded on one CD. However, this total will vary depending upon the size and number of stored images and cine loops in each exam.

To finalize and eject the CD:

- Use the shortcut by pressing <**Ctrl**> **E** on the alphanumeric keyboard.

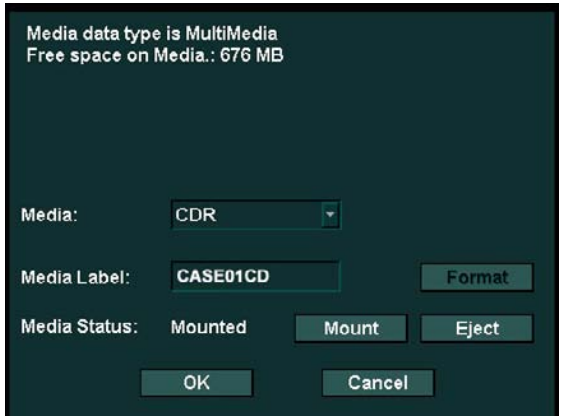
*NOTE: If the system has an MOD drive, a drop-down list is displayed as shown below. Select **CDR**.*

NOTE: Alternatively, perform the following steps (instead of using the <Ctrl> E shortcut previously described):

1. Press **Archive** on the control console.
2. Trackball to the **Utilities** soft rotary key and select **Media Utilities**.

*NOTE: If preferred, press <**Ctrl**> **M** as a shortcut to Step 1 and Step 2 above.*

The following message is displayed, at which stage the *Eject* button is enabled:



NOTE: The Format button is currently disabled, in order to protect the data on the CD.

3. Select **Eject**.

   The message "*Please Wait*" is displayed while the CD is being finalized. (This make take a while, so please be patient).

   When complete, the CD is ejected automatically.
4. Remove the CD from the CD-ROM drive.

   The CD is now ready for inserting and reviewing on any PC, as explained in the **Vivid 3 Release Notes SW 3.1**. For details, see *Using the MPEG Viewer on an External Computer.*

NOTE: Whenever a CD has been finalized, the user can only read the data from it - and no further data may be written to it. Attempting to access a CD before eject is completed, will result in removal failure.

NOTE: Whenever a CD is ejected (as described above, or at system shut-down), the CD tray opens automatically to enable removal of the CD. After removing the CD, push the CD tray in again to close it (or click OK).

CAUTION *Do not attempt to move the Vivid 3 system with the CD tray in the open position*!

Peripherals

For additional information, see *Chapter 12, Peripherals* in the User's Manual.

The following peripherals can operate with the System.

- Sony Black & White Thermal Video Printer
- Sony Color Thermal Video Printer
- HP InkJet Printer
- Video Cassette Recorder (VCR)
- JVC VCR

NOTE: The ultrasound system may also be used safely while connected to devices other than those recommended, if the devices and their specifications, installation and interconnection with the system conform to the requirements of IEC/EN 60601-1-1. The added device/s must have appropriate safety standard conformance and CE Marking.

Specifications for Peripherals

Please refer to the documentation accompanying the peripherals.

System Connections for Peripherals

On-board peripherals can operate from three power outlets:

- 8A @ 120 V or lower.
- 4A @ 220 V or higher.
- 500 VA total.

Link	Type
VGA Sockets (2)	
Socket	Video Out
Composite B&W	CCIR or RS-130
Composite Color	PAL or NTSC
S-Video	Y/C, PAL or NTSC
RGB	PAL or NTSC
Composite color PAL or S-Video	NTSC Video In Y/C, PAL or NTSC
Audio Stereo Left-Right Out	Audio Out (to VCR)
Audio Stereo Left-Right In	Audio In (from VCR)
External Microphone	
Remote Print Command	Make-Break by Relay TTL Levels (+5V to Ground)
Serial Ports (2)	RS-232
Socket	USB
Parallel Port	PC
Ethernet Network	RJ-9
Modem	RJ-6
Footswitch (on patient trace I/O front panel)	Vingmed S5, 3 button

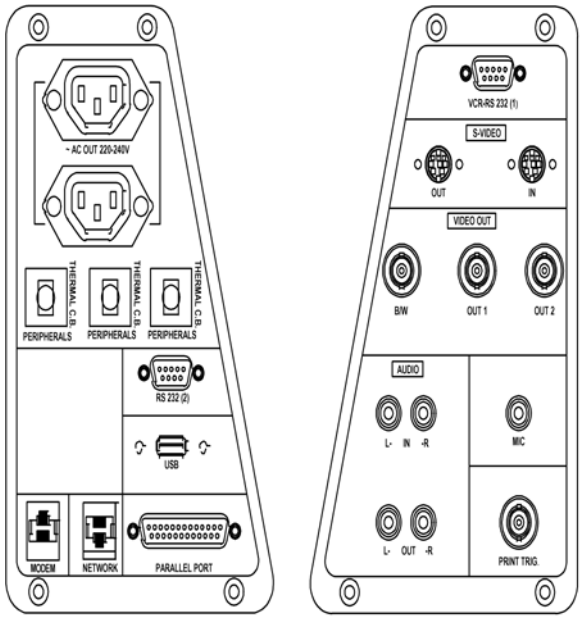


Figure 22: Rear Panel Connectors

Printing

The System supports printing for both black & white, and color thermal (on board) printers.

These two printers are controlled from the control panel using the **Print A** and **Print B** buttons.

To print on the Black & White thermal printer:

- Press **Print A** button.

To print on the Color thermal printer:

- Press **Print B** button.

HP InkJet Printer Configuration

To activate the HP DeskJet Toolbox:

1. While scanning in 2D-Mode, press **Freeze** to freeze the image.
2. TRACKBALL to the image and press **Menu**.
3. TRACKBALL to the **Explorer** option on the pop-up menu and press **Select**.
4. On drive U:, TRACKBALL to the appropriate printer file (For example, *HP DeskJet 970c Series V.2.0 Toolbox*, *HP DeskJet 990*, *HP Deskjet 6122*) and press **Select**.
5. Configure the printer settings according to the HP instructions.

NOTE: Other printer setting utilities are available using the System Configuration window. For details, refer to the Printers Tab section in Chapter 12, Peripherals in the User's Manual.

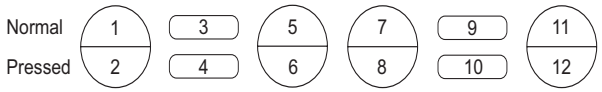
Video Cassette Recorder

The VCR is connected to the unit and operated using the control panel buttons and soft keys.

Important: Manual calibration and all measurement capabilities of the system can be performed on VCR-captured images.

VCR Operation

The soft key map and table below describe the function of each soft key in the VCR operation.



Soft Key	Status/Function		
	Play	**Freeze**	**Stop**
1		Cine Scroll	
2		RUN Cine	
3	Stop	Stop	Play
4	Search	Search	Stop
5			
6			
7			
8	Eject	Eject	Eject
9	Fast Forward	Fast Forward	Fast Forward
10	Rewind	Rewind	Rewind
11	Play Speed	Play Speed	
12	Freeze/Play	Freeze/Play	

The soft keys can be used to perform the following actions:

- **Play** and **Stop:** Starts and stops the playback.
- **Fast Forward:** Fast forwards the recording.
- **Rewind:** Rewinds the recording.
- **Play speed:** Adjusts the speed of all play modes (regular playback, fast forward and rewind).
- **Freeze:** Freezes the playback. The soft key controls enable cineloop review.
- **Search:** Searches for a specific counter number location while the VCR is in either **Play** or **Freeze** status.
- **Search Blank**: Searches for the start of a blank (unrecorded) section. (Operates in *forwards* direction only).
- **Eject:** Ejects the VCR tape.

Important: Once connected to the unit, only the **Eject** button is active on the VCR machine.

VCR Soft Menu

The System enables the following VCR Soft Menu options:

- Press **Soft Menu**:

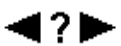
Pop-up Soft Menu
Contrast
Brightness
Horizontal Position
Vertical Position

VCR Status Information

VCR status information is displayed in the **VCR Control** area, at the bottom-right corner of the screen. The following three parameters are displayed:

- Tape name
- Counter number
- VCR status

The following VCR status icons, displayed on the screen in the **VCR Control** area, indicate the current VCR function.

	VCR on
	Fast Forward
	Rewind
	Play
	Searching
	Pause
	Stop
	Eject
	Shuttle - Jog
	VCR is inactive, although a video tape is in the VCR.

Important: Before starting to record, ensure that the tape label has been entered into the system, and that the VCR counter is set correctly.

Important: If the Smart VCR option is selected, a barcode is displayed in the upper-right corner of the screen. This option enables M&A measurements and annotations to be made on played-back images. For details, refer to the VCR/ECG Tab in *Chapter 14, Presets and System Setup* of the User's Manual.

Recording and Reviewing an Examination

To record an examination:

- Press **VCR Record**. A red dot is displayed on the screen near the VCR counter, indicating that recording has begun.
- Press **VCR Record** again to stop recording.

To playback a recorded exam:

1. Press **VCR Play B**.
2. View the playback and press **Freeze** at the appropriate point.
3. If necessary, move the two markers.
4. Trackball to adjust to the required position.
5. Press **Measure** or **Caliper**, to perform measurements.

Adjusting the Counter

To adjust the counter:

1. TRACKBALL to the counter in the **VCR Control** area on the screen.
2. Enter an identifying name in the **Tape name** field, if required.
3. Enter the counter number in the counter field
   OR
   TRACKBALL to **Reset Counter** and press **Select** to reset the counter to 0:00:00.
4. TRACKBALL to **Done** and press **Select** to save the changes.

NOTE: Selecting **Cancel** *will undo the current changes to the counter.*

Searching for a Counter Number

To search for a specific counter number:

1. Press the **Search** soft key.
2. TRACKBALL to the **Counter Number** field and use the alphanumeric keyboard to manually adjust the counter number to the required number.
3. TRACKBALL to the **Go To** button and press **Select**. The VCR will begin the search, displaying a **Search** icon in the **VCR Control** area of the screen. Once the required counter number is found, the **VCR status** icon will switch to the **Play** icon, and the VCR will begin playing back the tape from the user-selected location.

Searching for the Start of a Blank Section

To search for the start of a blank (unrecorded) section:

1. Press the **Search** soft key.
2. TRACKBALL to **Search Blank** and press Select:

The search commences and the message *"Searching blank space, please wait"* is displayed.

On reaching the start of the unrecorded section, the search process stops and the message window closes.

Probes

For additional detailed information, see *Chapter 13, Probes* in the User's Manual.

Environmental Requirements

Probes should be operated, stored, and transported within the parameters outlined below.

Property	Operational	Storage	Transport
Temp.	10^{o} to 40^{o} C 50^{o} to 104^{o} F	-10^{o} to 60^{o} C 14^{o} to 140^{o} F	-40^{o} to 60^{o} C -40^{o} to 140^{o} F
Humidity	30% to 85% non-condensing	30% to 90% non-condensing	30% to 90% non-condensing

Probe Orientation

Some probes have an indentation (notch) for orientation on the probe housing. Other probes are provided with a green orientation LED near their heads. This notch or LED corresponds with a green dot on the scanning screen that indicates the orientation of the probe to the scan.

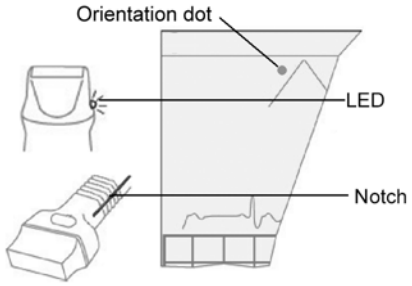


Figure 23: Orientation Markers on Probe

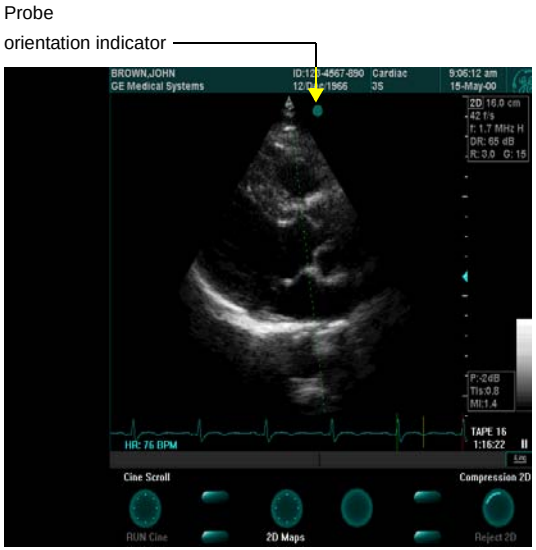


Figure 24: Probe Orientation Screen

Probe Labeling

Each probe is labeled with the following information:

- Name of distributor and manufacturer
- Operating frequency
- GE model number
- Probe serial number
- Month and year of manufacture

The probe name, displayed on the probe housing and the connector, can be read when the probe is connected to the unit.

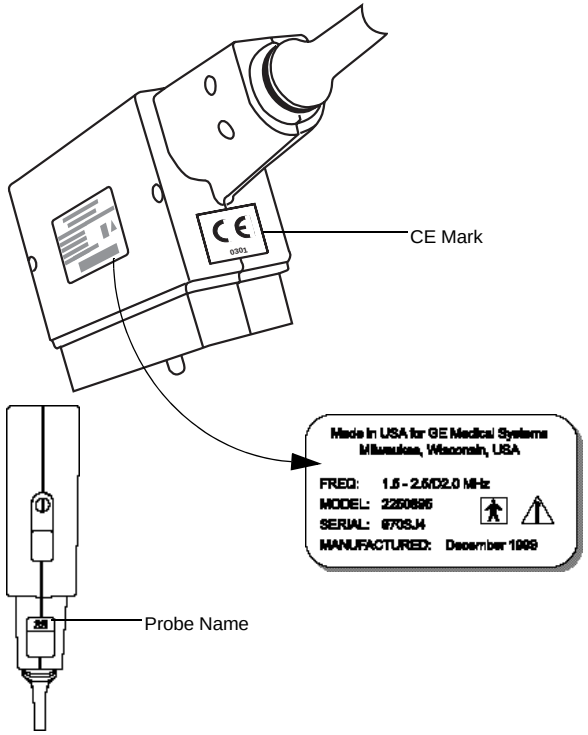


Figure 25: Probe Labeling Example

The probe name, together with a picture of the probes currently connected to the unit, is displayed on the Select Probe Application screen.

- **Vivid 3 Systems with 2 ports:**

  The Select Probe Application screen on the **Vivid 3** ultrasound unit will display three possible probe connections, two active probes and one pencil probe as shown below:

Figure 26: Select Probe & Application Screen (2 Ports)

- **Vivid 3 Systems with 3 ports:**

  The Select Probe and Application screen on the **Vivid 3** ultrasound unit will display four possible probe connections, three active probes and one pencil probe, as shown below:

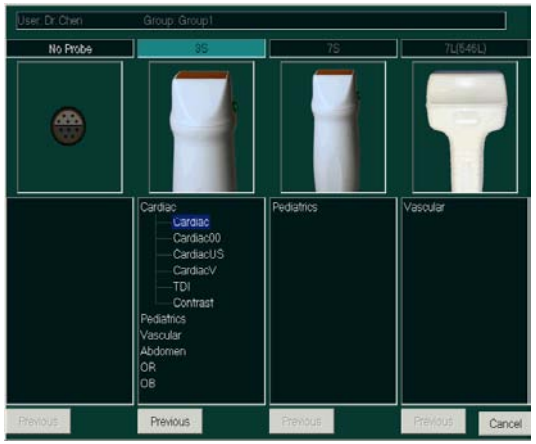


Figure 27: Select Probe & Application Screen (3 Ports)

Probe Integration

The transesophageal probes require special handling. Refer to the user documentation enclosed with these probes.

Connecting the Probe

Probes can be connected to the **Vivid 3** ultrasound unit at any time, whether the unit is on or off.

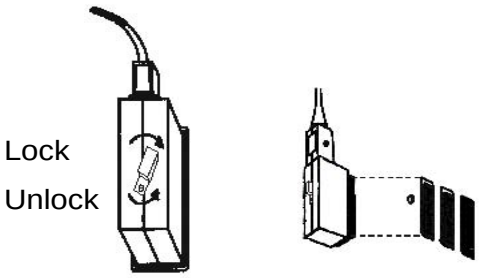
DO NOT touch the patient and any of the connectors on the ultrasound unit simultaneously, including the ultrasound probe connectors.

To connect a probe:

1. Carefully remove the probe from its storage case and unwrap the cord.

Do not allow the probe head to hang free. Impact to the probe head can result in irreparable damage.

2. Place the probe in one of the probe holders on the left or right side of the control panel.
3. Rotate the lock on the connector counterclockwise to unlock it.
4. Align the connector to the probe port, as shown below, and carefully push it into place, with the cable pointing upwards.
5. Rotate the lock clockwise to secure the probe connector.



6. Position the probe cord so that it is not resting on the floor, enabling it to move freely.

NOTE: Take the following precautions with probe cables:

- Keep free from unit's wheels.
- Do not bend.
- Do not cross cables between probes.

Activating the Probe

When a probe is connected to the unit, it is automatically detected by the unit.

To activate a probe while scanning a patient:

1. Press **Probe** on the control panel.
2. TRACKBALL to the required probe and application and press **Select**.
3. The probe and application are selected.

Coupling Gels

During an ultrasound scan, a conductive gel or couplant must be applied liberally to the probe to ensure optimal transmission of energy between the patient and the probe.

Coupling gels should not contain ingredients known to cause damage.

For example:

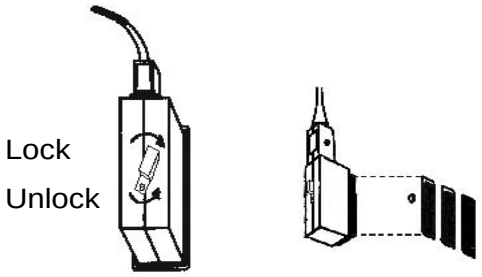
- Methanol, ethanol, isopropanol or any other alcohol-based product
- Mineral oil
- Iodine
- Lotions
- Lanolin
- Aloe vera
- Olive oil
- Methyl or ethyl parabens (para hydroxybenzoic acid)
- Demethylsilicone

Disconnecting the Probe

Probes can be disconnected at any time from the System, regardless of whether the unit is on or off.

To disconnect probes:

1. Rotate the probe connector lock counterclockwise to unlock, as shown below:



2. Ease the connector from the port.
3. Ensure that the probe head is clean before placing the probe in its storage box.

NOTE: All probes not connected to the unit should be stored in their provided storage cases.

Care and Maintenance

Follow the maintenance schedule below to ensure optimal operation and safety.

Task	After Each Use	Daily
Inspect the Probes	x	
Clean the Probes	x	
Disinfect the Probes	x	

Improper handling can lead to early probe failure and electric shock hazards. Follow the specific cleaning and disinfection procedures provided in this chapter and the germicide manufacturer's instructions. Failure to do so will void probe warranty.

Inspecting Probes

Inspect the lens, cable, and housing of a probe following each use. Look for damage that might allow liquid to enter the probe. Inspect the probe prior to use for damage to, or degeneration of, the housing, strain relief, lens, and seal.

If any damage is found, do not use the probe until it has been repaired by a GE service representative.

Keep a maintenance log and note of all probe malfunctions.

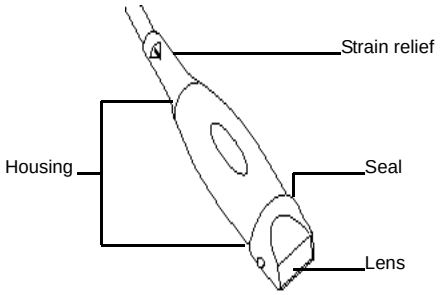


Figure 28: Probe Parts

Cleaning Probes

Probes should be kept clean in order to maintain optimal performance and avoid risk of disease transmission.

IMPORTANT

When cleaning a probe, ensure that the level to which it is immersed in cleaning fluid ***does not exceed*** the recommended maximum probe immersion levels shown below.

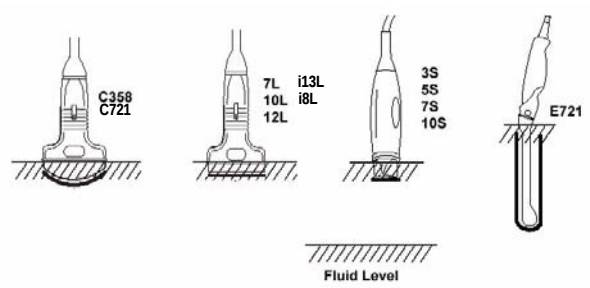


Figure 29: Maximum Probe Immersion Levels

To clean the probe:

1. After each use of a probe, disconnect it from the unit and remove all coupling gel, by wiping the probe with a soft cloth and rinsing with water.
2. Wash the probe with mild soap in lukewarm water, taking care not to immerse it past the level indicated in its immersion diagram.
3. Scrub the probe with a soft sponge, gauze, or cloth to remove all residue from its surface. Prolonged soaking or scrubbing with a soft bristle brush may be necessary if material has dried onto the surface of the probe.
4. Rinse the probe with clean water to remove all soap residue.
5. Air dry or dry with a soft cloth.
6. Disinfect the probe, as described in the following section.

Disinfecting Probes

Ultrasound probes must undergo high-level disinfection and be covered by a sterile sheath, using sterile techniques, when performing scans where the skin surface is compromised (for example, during biopsy or intraoperative procedures). High-level disinfection can be achieved using a liquid chemical germicide.

The recommended germicide for this use on all GE probes is Cidex (not Cidex 7 nor Cidex Plus). Cidex has been evaluated and found to be compatible with the probe materials. Please refer to the Reference Manual for alternative germicides that can be used.

For proper handling and exposure times, always refer to the labeling provided with the germicide for high-level disinfection.

All visible residue must be removed during the cleaning process to ensure effectiveness of the germicide.

To disinfect the probe:

1. Prepare the germicide solution according to the manufacturer's instructions. Follow the manufacturer's precautions for storage, use, and disposal.
2. Place the clean dried probe in contact with the germicide for the time duration specified by the manufacturer.

NOTE: High-level disinfection is recommended for surface probes and is required for transesophageal probes. Follow the germicide manufacturer's recommended contact time.

3. After removing the probe from the germicide, rinse it according to the germicide manufacturer's instructions. Flush all germicide residue from the probe and air dry.
4. Reconnect the probe to the unit, or store it in its container.

Follow the precautions listed below to prevent serious injury or equipment damage.

- Do not immerse the probe in liquid beyond the level specified for that probe. Never immerse the probe connector or probe adapters in liquid.
- Do not soak or saturate probes with solutions containing alcohol, bleach, ammonium chloride compounds, or hydrogen peroxide.
- Avoid contact with solutions or coupling gels containing mineral oil or lanolin.

Probe Safety

Electrical Hazards

Electrical Hazard

- Probes are driven by electricity, which can injure the patient or user when exposed to contact with conductive solution.
- DO NOT immerse the probe into any liquid beyond the level shown above. Never immerse the probe connector or adaptors into any liquid.
- DO NOT subject the probes to mechanical shock or impact, which may result in cracks or chips in the housing and degraded performance.
- Inspect the probe before and after each use, for damage or degradation to the housing, strain relief, lens, and seal.
- DO NOT apply excessive force to the probe cable, to prevent insulation failure.
- Electrical leakage checks should be performed regularly by a GE service representative or qualified hospital personnel. Refer to the Service Manual for leakage check procedures.

Mechanical Hazards

Take the following precautions to avoid mechanical hazards:

- Observe immersion levels, as shown in immersion figure above.
- DO NOT apply excessive force when inserting or manipulating the transesophageal probe.
- Inspect probes for sharp edges or rough surfaces that could injure sensitive tissue.
- DO NOT bend or pull the cable forcefully, to avoid mechanical shock or impact to the probe.

Biological Hazards

Biological Hazard

To minimize disease transmission, legally marketed, sterile, pyrogen-free sheaths should be used for each probe recommended for biopsy, intracavity, or intraoperative procedures. The flexible, disposable sheath should cover the probe and the probe cable.

To reorder sheaths, contact:

CIVCO Medical Instruments Co., Inc.
102 Highway 1
South Kalona, Iowa 52247
U.S.A.

- Adequate cleaning and disinfection are essential to prevent disease transmission. It is the responsibility of the user to verify and maintain the effectiveness of the infection control procedures in use. Always use sterile, legally marketed probe sheaths for transesophageal procedures.
- Devices containing latex may cause severe allergic reactions. Refer to *Medical Alert on Latex Products*, FDA, March 29, 1991, in the Reference Manual for further information.
- DO NOT use pre-lubricated condoms as a sheath for a probe. Lubricants in condoms may not be compatible with probe construction.

Probe Types

The System supports five types of probes.

- **Phased Array Sector Probes**: Phased Array Sector probes are designated by the suffix "S"; the multi-plane TEE probe is designated by the prefix "P" or the suffix "T".
- **Continuous Wave Doppler Probes**: Continuous Wave Doppler probes are designated by the prefix "P" and the suffix "D".
- **Curved Array (Convex) Probes**: Convex probes are usually designated by the prefix/ suffix "C".
- **Linear Array Probes**: Linear Array probes are designated by the prefix/suffix "L".
- **Intraoperative Probes**: Intraoperative probes are designated by the prefix "i" or "T".

Probe Definitions

The designations of the letters in the name of a probe are defined as follows:

Designation	Definition
B	Bipolar Endocavity
E	Endo
L	Linear
S	Sector
C	Curved
i or T	Intraoperative
T or P	TEE (Single or Multiplane)
P or D	CW Doppler

Non-Imaging Doppler Pencil Probes

P2D Probe

Catalog No.	H4830JE
Intended Uses	Cardiology
Doppler Frequency	2.0

P6D Probe

Catalog No.	H4830JG
Intended Uses	• Carotid • Vascular • Extremities
Doppler Frequency	5.0 - 6.7

Phased Array Sector Probes

3S Probe

Catalog No.	H4550SZ
Intended Uses	• General Cardiology • Pediatric Cardiology • Transcranial • Vascular
Image Frequency	1.5 - 3.6
Doppler Frequency	1.8 - 2.5

5S Probe

Catalog No.	H40422LA
Intended Uses	• General Cardiology • Pediatric Cardiology • Vascular
Image Frequency	2.2 - 5.0
Doppler Frequency	2.5 - 3.6

7S Probe

Catalog No.	H40422LB
Intended Uses	• General Cardiology • Neonatal head • Pediatric Cardiology • Vascular
Image Frequency	3.3 - 8.0
Doppler Frequency	3.6 - 4.0

10S Probe

Catalog No.	H4901PC
Intended Uses	• Pediatric Cardiology • Neonatal head • Vascular
Image Frequency	4.0 - 10.0
Doppler Frequency	4.0 - 6.7

6T Probe

Catalog No.	H45521DX
Intended Uses	• General Cardiology • Transesophageal
Image Frequency	3.5 - 6.5
Doppler Frequency	4.0 - 5.0

9T Probe

Catalog No.	H45521DY
Intended Uses	• Pediatric Cardiology • Transesophageal
Image Frequency	4.0 - 8.0
Doppler Frequency	3.6 - 5.0

Curved Array (Convex) Probes

C358 Probe

Catalog No.	H40212LC
Intended Uses	• Abdominal • OB/GYN • Vascular
Image Frequency	1.8 - 5.0
Doppler Frequency	2.0 - 3.1

C721 Probe

Catalog No.	H400602LM
Intended Uses	• Neonatal • Vascular
Image Frequency	4.0 - 10.0
Doppler Frequency	4.0 - 6.7

Linear Array Probes

7L (546L) Probe

Catalog No.	H40412LF
Intended Uses	• Carotid • Lower and upper extremities • Superficial • Vascular
Image Frequency	3.6 - 8.0
Doppler Frequency	3.6 - 5.0

10L (739L) Probe

Catalog No.	H40412LG
Intended Uses	• Carotid • Lower and upper extremities • Superficial • Vascular
Image Frequency	5.7 - 10.0
Doppler Frequency	4.4 - 6.7

12L Probe

Catalog No.	H40212LH
Intended Uses	• Carotid • Lower and upper extremities • Small parts • Intraoperative • Superficial • Vascular
Image Frequency	5.7 - 13.3
Doppler Frequency	4.4 - 6.7

i739 Probe

Catalog No.	H40212LF	
Intended Uses	• General • Intraoperative	
Image Frequency	5.7 - 10.0	
Doppler Frequency	4.4 - 6.7	

T739 Probe

Catalog No.	H40212LM	
Intended Uses	• General • Intraoperative	
Image Frequency	5.7 - 10.0	
Doppler Frequency	4.4 - 6.7	

i8L Probe

Catalog No.	H45511NW	
Intended Uses	• Vascular • Small parts • Cardiac • Intraoperative	
Image Frequency	5.0 - 10.0	
Doppler Frequency	5.0	

i13L Probe

Catalog No.	H45511NT	
Intended Uses	• Vascular • Small parts • Cardiac • Intraoperative	
Image Frequency	5.0 - 13.3	
Doppler Frequency	5.0	

E721 Probe

Catalog No.	H40206LN	
Intended Uses	• Transvaginal-OB/GYN • Transrectal-Urology	
Image Frequency	4.0 - 10.0	
Doppler Frequency	4.0 - 6.7	

PAMTE Adapter

Catalog No.	H45001YF
Description	Adapter that connects the following Vivid FiVe and System FiVe probes to the **Vivid 3** system**:** • PAMPTE (H4830KK) • 6Tv (H45011AA)

Transesophageal Probe

Refer to the *Multiplane TE Probe User Manual*, enclosed with the probe. The manual includes detailed maintenance and safety issues.

Presets and System Setup

For additional information, see *Chapter 14, Presets and System Setup* in the User's Manual.

Application Presets

Application presets, which determine the settings a probe will use for the study, are configured for each probe type. The presets are selected in the *Select Probe and Application* screen. The name of the current application preset is displayed in the title bar at the top of the screen when in any scanning mode.

There are three different types of presets:

- **Factory-defined presets**: Supplied as part of the system.
- **User-modified presets**: Modified by the user and saved under the factory-defined name.
- **User-created presets**: New presets created and defined by the user, and saved under a unique name.

Important: New preset settings are valid only for the specific combination of probe, application icon, and patient type.

Selecting an Application Preset

To select a probe application preset:

1. Press **Probe**.
2. TRACKBALL to the required application preset and press **Select**.

Modifying Factory-defined Presets

To modify a factory preset:

1. Select the probe and application preset.
2. Adjust the scanning parameters in any of the scanning modes, as required.
3. While the unit is in scanning mode, simultaneously press **<Ctrl>** + **<Preset>**.
4. TRACKBALL to **Save Current** and press **Select** to save the user-modified preset under the factory-defined preset name.

Restoring Factory-defined Presets

Important: Only user-modified presets can be restored to their original settings.

To restore factory presets:

1. Press **Probe**.
2. TRACKBALL to the application preset for which the factory preset settings are to be restored, then press **Select**.
3. Simultaneously press **<Ctrl>** + **<Preset>**.
4. TRACKBALL to **Restore Factory** and press **Select**.

User-created Application Presets

To create a new user-created application preset:

1. Select a probe and application preset.
2. Adjust the scanning parameters as required.
3. While the unit is in scanning mode, simultaneously press **<Ctrl>** + **<Preset>**.
4. TRACKBALL to the **Create new** field and use the alphanumeric keyboard to type a name for the new application preset.
5. TRACKBALL to **Save with New Name** and press **Select**.

Important: Ensure that the preset is saved under a unique name. If a factory-defined or user-modified preset name is used, the previous preset will be replaced and lost.

To delete a user-created application preset:

1. Press **Probe**.
2. TRACKBALL to the name of the user-created preset that is to be deleted.
3. Press **Menu**.
4. TRACKBALL to **Delete** and press **Select**.

Important: Only user-created presets can be deleted from the system. Factory-defined presets and user-modified presets cannot be deleted.

System Configuration

The System Configuration window enables the user to customize various settings and preferences related to basic operating parameters, using the tabs listed below.

To perform system configurations:

1. Press **Config**.
2. TRACKBALL to the required tab and press **Select**.
3. Configure the parameters.

Hospital Tab

Enables the user to configure basic information about the facility, such as its name, address, and telephone and fax numbers.

System Tab

Enables the user to configure display-related settings, such as the System date and time, and to define the footswitch operation; also password protection and keyboard and language selection.

Use Password Checkbox

Enables the user to password-protect the archived data in the system, thus ensuring patient confidentiality. If this checkbox is selected (indicated by a checkmark ☑), the *User Log On* dialog box is displayed automatically each time the System is started. The System password must be entered in this dialog box before the user is allowed to retrieve information from, or save information to, the Patient Archive. If this checkbox is not selected, no password is needed to access the archive.

Keyboard Field

Enables the user to activate support of the international text keyboard and other special characters.

1. Press **Config**.
2. TRACKBALL to the **System Tab** and press **Select**.
3. TRACKBALL to **International** in the **Keyboard** dropdown list and press **Select**.

To type international characters:

1. Simultaneously press and hold **<Ctrl>** + **<Alt>**.
2. Press the special character required with the other hand (press the **<Caps Lock>** key when required).

See *Chapter 14*, *Presets and System Setup* in the User's Manual for the International Characters that use (or don't use) the Caps Lock key.

Language Field

Enables the user to define the required language of both the user interface and on-line help support.

Preset Buttons

- **Save Presets** – enables the user to save application presets, measurement and analysis configurations, stress templates, and system presets to diskettes.
- **Restore Presets** – enables the user to restore presets from diskettes.
- **Restore Factory** – removes all user-modified and user-created presets, and reinstates the factory-defined presets.

NOTE: See Chapter 14, *Presets and System Setup in the User's Manual for save and restore preset procedures.*

MA Options Tab

Enables the user to select the tools that will be available in Measurement and Analysis modes. These tools include menus, studies, parameters in each study, OB graphs, etc.

Archive Tab

Enables the user to set general parameters related to the Archive function, including:

- Cineloop viewing
- Patient information
- Confirmation of deletion commands
- Type of backup device
- Ejection of backup media upon shutdown
- Export file paths
- Split screen management
- Automatic Patient ID (required for EchoPAC connectivity)
- FlexiView automatic storage time intervals
- Backup on power down

Important: The **Archive Tab** is displayed even if the Archive Package option is not installed.

Archive Links Tab

Enables the user to assign short-cut keys for easy archiving of an exam. In this way, the linking of source (*From*) and destination (*To)* directories saves time, by eliminating the need to scroll through many windows.

Export functions may be assigned as short-cuts to any one of the four assignable soft-menu buttons:

- **DICOM Print**
- **DICOM Storage Server**
- **DICOMVueCDR**
- **DICOMVueMOD525**
- **Excel Export**
- **MPEGVueCDR**
- **MPEGVueNET**

1. Press **Config**.
2. TRACKBALL to the **Archive Links** tab and press **Select**.
   The Archive Links tab is displayed.
3. TRACKBALL to the *left* side of the window and select the required action; select the required export function to be associated with the shortcut (refer to the above list).
4. Click **OK**.

Stress Tab

Enables the user to manage stress templates, including:

- Stress template selection.
- Default stress template designation.
- Definition of the order of Quad View stress exams during Analyze Mode.
- Templates available in the System, listed in the left area.
- Templates activated for the Stress Package, listed in the right area.

Important: The Stress tab will only be displayed if the Stress Package option is installed.

Report Tab

Enables the user to set general parameters related to reports, including:

- Report template selection for specific applications.
- User-defined report template creation.
- Default report template designation.
- Insertion of user-supplied logo into report template(s).
- All available factory-defined templates, any user-created templates for the selected application, or any user templates designed on the Report Designer, listed in the left area.
- All templates that the user has selected which are currently active, listed in the right area.

VCR/ECG Tab

Enables the user to set parameters for the video recorder and ECG unit connected to the System.

Configures the printer assignment of both **Print A** and **Print B** control panel buttons.

Annotation Settings Tab

Enables the user to define the primary and secondary fonts used for annotations. In this tab, the user can define the fonts, as well as the default position (home location) of the text cursor on the screen when the **Text** key on the alphanumeric keyboard is pressed.

System Options Tab

Enables the user to install optional features to the system, such as: Patient Archive, 3D Option, MPEGvue, and DICOM Print.

If an incorrect password is entered in the **Key** field and the **Apply** button is selected, the option, even if it has already been correctly installed in the System, will be removed from the System.

To access the System Options Tab:

1. Press **Config**.
2. Trackball to **System Options** tab; press **Select**.
3. Trackball to the required option and activate the appropriate radio button:
   - Patient Archive
   - 3D Option
   - MPEGvue
   - DICOM Print
4. Click **OK**.

Vocabulary Tab

Enables the user to add, modify, remove, and change the placement of vocabulary used in the Annotations Package. Factory presets can also be restored.

Configurations are made for each application preset. The title bar near the top of the tab will always show the Probe/Application/Preset. The vocabulary of that specific probe and application can be added to or modified.

NOTE: Ensure that the user is logged on to the correct preset before making any changes.

Printers Tab

Enables the user to configure and set the default printer, calibrate the printer, as well as control the speed versus the quality of the printout.

Connectivity Tab

Enables the user to view the dataflow connection and communication setup of the System with other devices in the hospital information system.

NOTE: Secure password access to additional configuration tabs are available to service personnel or authorized personnel. For details, refer to the ***Vivid 3 Service Manual.***

Miscellaneous Tab

Enables the user to select various Doppler and measurement options, including Smart Doppler 60 and OB Mini Report. In addition, may be used to enable Automatic Tissue Optimization (AT0).

To access the Misc Tab:

1. Press **Config**.
2. Trackball to **Misc** tab and press **Select**.

To enable ATO:

1. Activate the **Display ATO** check box (under *ATO* on the left).
2. Trackball to **OK**.

The Miscellaneous Tab also provides additional system option controls, as shown below.

NOTE: After each change, trackball to ***OK*** *to accept the command.*

Hip Joint Meas. - Hide/Display Line Names

To Display/Hide Hip Joint Line Names:

- Activate/clear the **Hip Joint Names** check box (under *Measurements* on the left).

Biopsy Guide Zone

The Biopsy controls are located on the *right* side of Miscellaneous Tab window, under *Biopsy*.

To Display/Hide the Guide Zone Center Line:

- Activate/clear the **Show Center Line** check box.

To Change Distance Between Center Line Dots:

- Activate/clear the **Enable 0.5 cm** check box.

To Display/Hide the Guide Zone Outer Lines:

- Activate/clear the **Enable 0.5 cm** check box.

Users

Logging on to the System as a user and part of a default or user-defined group enables user group-specific settings and presets to be used.

Important: Systems without the Archiving option do not support user groups.

Up to five user groups can be configured in the System. Unique System presets can be configured for each user group. Each group's presets are independent of the presets of other user groups.

When a user logs on, the System presets defined for that user's group are loaded.

If a user does not want to belong to a special group, they can be assigned to the Default user group, which is the main group of users.

NOTE: On Systems without the Archiving option, all users are members of the **Default** *user group.*

Adding a New User

To add a new user to the system:

1. Press **Archive**.
2. Press the **Utilities** soft key.
3. Press the **Personnel List** soft key.
4. Press the **Add** soft key.
5. Enter the user information in the fields using the TRACKBALL or the **Tab** key to move between fields.
6. Press the **Done** soft key to save the information.

Editing a User

To edit a user:

1. Press **Archive**.
2. Press the **Utilities** soft key.
3. Press the **Personnel List** soft key.
4. TRACKBALL to the user whose information is to be edited.
5. Press the **Edit** soft key.
6. Use the TRACKBALL or **Tab** key to move between fields.
7. Press the **Done** soft key to save the changes.

User Logon

Logging on as a user and part of a defined group enables the use of user-specific and user-defined settings and presets. In addition, the user name is automatically entered in the *Exam Comments* page of the *Patient Details* screen.

The System can be operated without logging on as a user. In this case, the System loads the settings and presets of the last user group to be activated.

NOTE: The first time the System is operated, the user is defined as a default user belonging to the **Default** *group, the main group of users.*

To log on:

1. Simultaneously press **<Ctrl>** + **<U>**.
2. TRACKBALL to the appropriate user name in the **Select your name** dropdown list and press **Select**.
   To choose a dataflow, TRACKBALL to the required dataflow in the **Dataflow** dropdown list and then press **Select**.
3. TRACKBALL to **OK** and press **Select**. The user group to which the user belongs is displayed in the **Group** field.
4. If the System is password protected, a password will be requested. TRACKBALL to the **Password** field and enter the System password.
5. TRACKBALL to **OK** and press **Select**.

NOTE: The user's name and user group are displayed in the title bar at the top of the screen.

User Maintenance

For additional information, see *Chapter 15, User Maintenance* in the User's Manual.

Periodic Maintenance

A schedule of periodic maintenance is strongly recommended. This should be coordinated with the local service organization in your country. Regular maintenance of the System ensures that the System operates correctly and remains fully functional.

As part of periodic maintenance routine safety inspections are required at least every two years. The safety inspections should verify compliance to applicable safety standards (e.g., EN 60601-1).

Safety measurements must be performed after repairs according to local regulation (e.g., Germany, Austria: Safety Standard VDE 0751-1 required by German Medical Device Ordinance, BGV A2).

NOTE: As part of a periodic maintenance program, the System's isolation transformer should be tested at least every two years, to facilitate the detection of possible short-circuits between the secondary output and ground.

iLinq

The iLinq feature enables GE service personnel to remotely access the System to perform basic system diagnostics and problem identification.

Important: Always coordinate with GE service personnel before activating iLinq.

To activate iLinq:

1. Advise GE service personnel that **iLinq** is being activated.
2. TRACKBALL to the **iLinq** icon, located in the bottom-right corner of each of the scanning and archiving screens, above the soft key menu, as shown below:

Figure 30: iLinq Icon

3. Press **Select**. The icon changes and GE service personnel are allowed to remotely access the system.

NOTE: During diagnostic testing by GE service personnel, the user will be advised of the diagnostics being done by prompts displayed on the screen.

4. When GE service personnel advise that the remote service is complete, TRACKBALL to the **iLinq** icon and press **Select** to deactivate the feature. The standard **iLinq** icon is displayed.

Inspecting the System

The following components of the System should be examined at least once a month:

- Connectors on cables, for any mechanical defects.
- Entire length of electrical and power cables, for cuts or abrasions.
- Equipment, for loose or missing hardware.
- Control panel, for defects.
- Brakes.

To avoid electrical shock hazard, do not remove panels or covers from the console. Qualified service personnel must perform this servicing. Failure to do so could cause serious injury.

Electrical Hazard

If any defects are observed or malfunctions occur, do not operate the equipment, and inform a qualified service representative.

Cleaning the Unit

The **System** requires weekly care and maintenance to function safely and properly.

Important: The ultrasound unit must be shut down (power off) during the cleaning process.

The following components should be cleaned, as described below:

- **Air Filter**: Clean the unit's air filter to ensure that a clogged filter does not cause the unit to overheat and reduce system performance and reliability. It is recommended that the filter be cleaned *once a month*. The air filter is situated in the front of the unit, above the probe connector area.
  Shake the filter in an area away from the unit. Wash the filter with a mild soapy solution, then rinse and dry with a cloth.

Important: Allow the filter to dry thoroughly before re-installing it in the unit.

- **Control Panel**: Diligent cleaning of the ultrasound unit's control panel reduces the risk of spreading infection from person to person, and also helps to maintain a clean working environment. Prior to cleaning, turn off the power to the system. Use a soft cloth moistened with water or a mild soap solution. For difficult spots or general cleaning, an all-purpose cleaner may also be used.
- **Monitor**: Gently wipe the monitor face with a soft, non-abrasive cloth. If necessary, moisten the cloth with a mild, non-abrasive detergent solution diluted with water.

Important: Do not use any type of solutions containing alcohol, benzene, or a similar additive, as these may damage the anti-reflective coating. To avoid scratching the screen surface, do not rub, touch or tap the screen surface with sharp or abrasive items, such as ballpoint pens.

- **System Cabinet**: Moisten a soft, non-abrasive folded cloth with a mild, general purpose, non-abrasive soap and water solution or a general purpose disinfectant. Wipe down the top, front, back and both sides of the system cabinet. *Do not spray any liquid directly into the unit.*

Prevention of Static Electricity Interference

Interference from static electricity can damage electronic components in the system. The following measures help reduce the likelihood of electrostatic discharge:

- At least monthly, wipe the alphanumeric keyboard and monitor with lint-free tissue or a soft cloth dampened with anti-static spray.
- Spray carpets with an anti-static spray because constant walking on carpets in or near the scanning room may be a source of static electricity.

Securely ground the unit using a power line or ground connector at the back of the system.

Handling Probes

All the probes for the **System** are designed and manufactured to provide trouble-free, reliable service. To ensure this, correct handling of probes is important and the following points should be noted:

- Do not drop a probe or strike it against a hard surface, as this may damage the transducer elements and acoustic lens, or may crack the housing.
- Do not use a cracked or damaged probe. If a probe is cracked or damaged, call the GE field service representative immediately to obtain a replacement.
- Avoid pulling, pinching or kinking the probe cable, since a damaged cable may compromise the electrical safety of the probe.

To avoid the risk of a probe accidentally falling, do not allow the probe cables to become entangled or to be caught by the wheels of the system.

NOTE: For detailed information on handling endocavity probes, refer to the appropriate supplementary instructions for each probe. Also, refer to Chapter 13, Probes in the User's Manual for detailed probe handling, cleaning and disinfecting instructions.

Troubleshooting

The system is engineered for reliable operation and consistent, high-quality performance. Automatic self-testing facilities are provided to monitor system operation and to detect faulty operation as soon as possible, thereby eliminating unnecessary downtime. The detection of any serious malfunction results in immediate interruption of scanning, and is indicated by an error message on the screen.

Monitor Alignment

Upon monitor or unit rotation, the monitor may display geometric distortion of the image tilt due to electromagnetic interference.

To correct image tilt distortion:

1. Press the **JAG**™ control dial found in the bottom-center of the lower monitor frame casing. The **Main** menu is displayed.
2. Rotate the **JAG** control dial to highlight the **MORE** option and press the **JAG** control dial. The **Advanced Options** menu is displayed.
3. Rotate the **JAG** control dial to highlight the **Rotation** icon, and press the **JAG** control dial to activate this option.
4. Rotate the **JAG** control dial to adjust the image display tilt and press the **JAG** control dial to save the tilt adjustment.
5. Rotate the **JAG** control dial to highlight **EXIT** and press the **JAG** control dial to exit the **Advanced Options** menu.
6. Rotate the **JAG** control dial to highlight **EXIT** and press the **JAG** control dial to exit the **Main** menu and return to the ultrasound display.

Activity Log and Problem Reports

The System automatically logs any error messages that occur during system operation, on a daily basis, for technical support analysis purposes (if required). These daily log reports are retained in the system and can be recalled for 90 days.

A reporting tool exists which enables the user or GE service personnel to download the log report to a floppy disk.

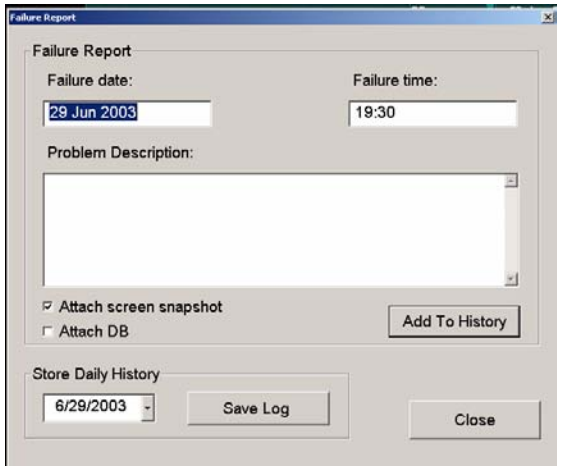


Figure 31: Failure Report Screen

In addition to the automatic error tracing, the reporting tool enables the user to create a specific problem report, by adding comments and embedding a current screen capture in the daily report.

To create a problem report:

1. Press **<Ctrl>** and **<F>** simultaneously on the alphanumeric keyboard. The *Failure Report* window is displayed, as shown below. The current date is displayed in the **Store Daily History** field, and the current time is displayed in the **Failure Time** field.
2. Enter a description of the problem or occurrence.
3. Select the **Attach screen snapshot** checkbox to attach the current screen capture, if required.

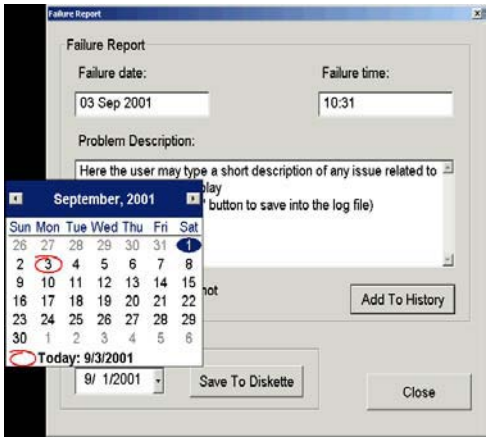


Figure 32: Problem Report Screen

4. TRACKBALL to the on-screen **Add To History** button and press **Select**. All comments entered and the current screen are captured and embedded into the daily log.

To download a daily log:

1. Press **<Ctrl>** and **<F>** simultaneously. The *Failure Report* screen is displayed, as shown above.
2. TRACKBALL to the **Store Daily History** dropdown list and press **Select**.
3. TRACKBALL to the required date and press **Select**.
4. TRACKBALL to the on-screen **Save to Diskette** button, and follow the system instructions. This downloaded report can then be given or sent by e-mail to GE technical support for analysis.

System Malfunction

Note the following points in the event of error or System malfunction:

- Write down all displayed error messages.
- Write down the System Serial Number, found on the label at the back of the unit.
- If possible, write down the currently installed software version.

To locate the software version:

1. Press **Config**. The *System Configuration* window is displayed.
2. TRACKBALL to the **System** Tab and press **Select**. The **System** Tab is displayed, showing the software version number in the title bar.
   - Write down the probe, imaging mode, application icon and application package that was in use at the time of the malfunction.
   - If applicable, write down the button or key sequence that immediately preceded the malfunction.
   - Turn the unit off.
   - Do not use the unit until authorized service personnel have restored it to its fully operational state.

Restarting the Unit

If the system malfunctions, the scanning is immediately interrupted and an error message is displayed. Once the malfunction has been fixed, restart the unit as described in the following procedure.

To restart the unit after a malfunction has occurred:

1. Verify that the LED label for the **On/Off** button is lit or blinking, indicating that the unit is in standby mode.
2. If the button label is not lit, check that the main power cable is plugged properly into the wall socket.
3. Note any displayed error messages.
4. Turn off all peripherals.
5. Switch the circuit breaker up to the ON position if it is in the OFF position. The circuit breaker should remain in the ON position.
6. Wait ten seconds before switching the unit back on.

Important: If the unit still does not complete its initialization process, disconnect the power cable and call the service representative.

Safety

For additional information, see *Chapter 16, Safety* in the User's Manual.

This section describes the important safety measures that should be taken before operating the System**.** Procedures for simple care and maintenance of the unit are also described.

Various levels of safety precautions may be found on the equipment. Different levels of severity are identified by one of the following icons that precede precautionary statements in the text.

The following icons are used to indicate precautions:

Indicates that a specific hazard exists that, given inappropriate conditions or actions, may cause:

- Severe personal injury
- Substantial property damage

Indicates that a specific hazard is known to exist that, given inappropriate conditions or actions, may cause:

- Severe personal injury
- Substantial property damage

.

Indicates that a potential hazard may exist that, given inappropriate conditions or actions, can cause:

- Minor injury
- Property damage

NOTE: Indicates precautions or prudent-use recommendations that should be used in the operation of the ultrasound unit, specifically:

- Use of the System as a prescription device, under the order of a physician.
- Maintaining an optimum unit environment.
- Reference to the User's Manual.

Important Safety Considerations

Notice Against User Modification

Never modify this product, including system components, software, cables, and so on. User modification may cause safety hazards and degradation in system performance. All modifications must be performed by qualified GE personnel.

This section includes considerations for the following:

- Patient safety
- Personnel and equipment safety

The information contained in this section is intended to familiarize the user with the hazards associated with the use of the unit, and to alert them to the extent to which injury and damage may occur if the precautions are not observed.

Users are obligated to familiarize themselves with these safety considerations and to avoid conditions that could result in injury or damage.

Patient Safety

The concerns listed below can seriously affect the safety of patients undergoing a diagnostic ultrasound examination.

Patient Identification

Always include proper identification with all patient data and verify the accuracy of the patient's name and/or identity number when entering such data. Ensure that the correct patient ID is provided on all recorded data and hard copy prints. Identification errors could result in an incorrect diagnosis.

Diagnostic Information

The images and calculations provided by the System are intended for use by competent users as a diagnostic tool. They are explicitly not to be regarded as the sole, irrefutable basis for clinical diagnosis. Users are encouraged to study the literature and reach their own professional conclusions regarding the clinical utility of the system.

The user should be aware of the product specifications and of the system accuracy and stability limitations. These limitations must be considered before making any decision based on quantitative values. If in doubt, consult the nearest GE Ultrasound Service Office should be consulted.

Equipment malfunction or incorrect settings can result in measurement errors or failure to detect details in the image. The user must become thoroughly familiar with the operation of the unit in order to optimize its performance and to recognize possible malfunctions. Application training is available through the sales representative.

Mechanical Hazards

Damaged probes or improper use and manipulation of the transesophageal probe can result in injury or increased risk of infection. Inspect probes frequently for sharp, pointed or rough surface damage that could cause injury or tear protective barriers (gloves and sheaths).

Transesophageal probe safety: Never use excessive force when manipulating the transesophageal probe. The detailed user manual enclosed with the transesophageal probe should be read carefully.

Electrical Hazard

A damaged probe can increase the risk of electric shock if conductive solutions come in contact with internal live pads. Inspect probes often for cracks or openings in the housing and holes in and around the acoustic lens, or other damage that could allow moisture to enter. Become familiar with the use and care precautions described in the *Care and Maintenance* section, in *Chapter 13* in the User's Manual.

Personnel and Equipment Safety

The hazards listed below can seriously affect the safety of personnel and equipment during a diagnostic ultrasound examination.

Explosion Hazard

Explosion Hazard

Never operate the equipment in the presence of flammable or explosive liquids, vapors or gases. Malfunctions in the unit, or sparks generated by fan motors, can electrically ignite these substances. Users should be aware of the following points to prevent such explosion hazards:

- If flammable substances are detected in the environment, do not plug in or turn on the system.
- If flammable substances are detected after the system has been turned on, do not attempt to turn off or unplug the unit.
- If flammable substances are detected, evacuate and ventilate the area before turning off the unit.

Implosion Hazard

Do not subject the unit to serious mechanical shocks because the cathode ray tube (CRT) can implode if struck or jarred. This may cause pieces of glass and/or phosphor coating to fly into the air and result in serious injury

Electrical Hazard

To avoid injury:

Do not remove the unit's protective covers. No user-serviceable parts are inside. If servicing is required, contact qualified technical personnel.

- Connect the attachment plug to a hospital-grade grounding outlet to ensure adequate grounding.
- Do not place liquids on or above the unit. Conductive fluids seeping into the active circuit components may cause short circuiting, which could result in an electrical fire.
- An electrical hazard may exist if any light, monitor or visual indicator remains on after the unit is turned off.
- Fuses blown within 36 hours of being replaced may indicate a malfunctioning electrical circuit within the system. In this event, the unit must be checked by GE Ultrasound service personnel. No attempt should be made to replace the fuses with others of a higher rating.

The internal circuits of the unit use high voltages, capable of causing serious injury or death by electrical shock.

Moving Hazard

Moving Hazard

Special care must be used to avoid injury when moving or transporting the unit.

- Always be sure the pathway is clear.
- Limit the speed of movement to a careful walk.
- Use at least two people when moving the unit on inclines.
- Ensure that the unit is well prepared before transporting. Refer to the *Transportation and Positioning* section, in *Chapter 2* in the User's Manual, for more information.

The **System** weighs between 160 kg – 190 kg (353 lb – 419 lb).

Biological Hazard

Biological Hazard

For patient and personnel safety, beware of biological hazards while performing transesophageal procedures. To avoid the risk of disease transmission:

- Use protective barriers (gloves and probe sheaths) whenever necessary. Follow sterile procedures, as required.
- Thoroughly clean probes and reusable accessories after each patient examination and disinfect or sterilize, as needed. Refer to Chapter 13, *Probes* in the User's Manual for probe use and care instructions.
- Follow all in-house infection control policies as they apply to personnel and equipment.

Pacemaker Hazard

The possibility of the system interfering with pacemakers is minimal. However, as this system generates high frequency electrical signals, the user should be aware of the potential hazard this could cause.

Device Labels

The following table describes the purpose and location of safety labels and other important information provided on the equipment.

Label/Icon	Purpose	Location
Identification and Rating Plate	• Manufacturer's name and address • Date of manufacture • Model and serial numbers • Electrical ratings	Rear of unit, near power inlet.
Class II	Class II Equipment, in which protection against electric shock does not rely on basic insulation only. Provides additional safety precautions such as double insulation or reinforced insulation, because there is no provision for protective earthing or reliance upon installation conditions.	Rear of unit.
	Type BF Equipment. Equipment providing a particular degree of protection against electric shock particularly regarding allowable leakage current and reliability of the protective earth connection.	Rear of unit, probe connectors.
Device Listing/ Certification Labels	Laboratory logos or labels that denote conformance with industry safety standards, for example, UL or IEC.	Rear of unit.
	This symbol indicates that the waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment (WEEE).	Rear of unit.

Electrical Safety

Internally Connected Peripheral Devices

The system, together with its peripheral devices, such as video tape recorders and printers, meets UL-2601-1 and EN 60601-1 standards for electrical isolation and safety. These standards are applicable only when the specified peripheral devices are plugged into the AC outlets provided in the unit.

Limits:

- Earth leakage current, normal conditions: 0,5 mA (BF).
- Earth Leakage current, single fault conditions: 1,0 mA (BF).

External Connection of Other Peripheral Devices

Other external devices, such as laser cameras, printers, VCRs, and external monitors, usually exceed allowable leakage limits, and when plugged into separate AC outlets that are then connected to the unit, are in violation of patient safety standards. Suitable electrical isolation of such external AC outlets may be required in order to meet UL-2601-1 and EN 60601-1 standards for electrical leakage.

UL-2601-1 Standard

Interconnection of external equipment must not exceed the total combined leakage current of 100µA under no-fault and single-fault conditions.

IEC 60601-1 Standard

Interconnection of external equipment should not exceed the total combined leakage current of 300 µA under no-fault and single-fault conditions.

Owner Responsibility

It is the responsibility of the owner to ensure that anyone operating the system reads and understands this section of the manual. However, there is no representation that the act of reading this manual renders the reader qualified to operate, inspect, test, align, calibrate, troubleshoot, repair, or modify the system. The owner should make certain that only properly trained, fully qualified service personnel undertake the installation, maintenance, troubleshooting, calibration, and repair of the equipment.

The System owners should ensure that only properly trained, fully qualified personnel are authorized to operate the system. Before authorizing anyone to operate the system, it should be verified that the person has read, and fully understands, the operating instructions contained in this manual. It is advisable to maintain a list of authorized users.

Should the system fail to operate correctly, or if the unit does not respond to the commands described in this manual, the user should contact the nearest Field Service Office.

For information about specific requirements and regulations applicable to the use of electronic medical equipment, consult the appropriate local, state and federal agencies.

For USA Only: Federal law restricts this device to use by, or on the orders of, a physician.

Possible Biological Effects

For a detailed explanation of possible biological effects, refer to the Reference Manual, which includes a copy of *Medical Ultrasound Safety,* American Institute of Ultrasound and Medicine, 1994.

Power Information on Screen

In the scan parameter area, two fields are allocated for the display of power values as follows:

MI =
TIX =

Abbreviation	Description
MI	Mechanical Index
TIB	Thermal Index in Bone
TIS	Thermal Index in Soft Tissue
TIC	Thermal Index in Cranium
TIX	**TIB**, **TIS**, or **TIC**. Selected in accordance with the mode of operation and the application.

Safety of Ultrasound

ALARA Statement

Ultrasound procedures should be performed using output levels and exposure times As Low As Reasonably Achievable (ALARA) while acquiring clinical information.

The System employs the principle of ALARA in configuring factory defaults.This default level takes effect:

- When the system is first turned on.
- When a new patient is entered.
- When changing from one exam category to another.
- When changing from one application to another.

Refer to the Reference Manual, which includes a copy of *Medical Ultrasound Safety*, American Institute of Ultrasound and Medicine, 1994, for further details.

Training

During each ultrasound examination, the user is expected to weigh the medical benefit of the diagnostic information that would be obtained against the risk of potential harmful effects. Once an optimal image is achieved, the need for increasing acoustic output or prolonging the exposure cannot be justified.

It is recommended that all users receive proper training in applications before performing them in a clinical setting. Contact the sales representative for training assistance.

Allergic Reactions to Latex-Containing Medical Devices

Due to reports of severe allergic reactions to medical devices containing latex (natural rubber), the FDA advises health-care professionals to identify latex-sensitive patients, and be prepared to treat allergic reactions promptly. Latex is a component of many medical devices, including surgical and examination gloves, catheters, incubation tubes, anesthesia masks and dental dams. Patient reaction to latex has ranged from contact urticaria to systemic anaphylaxis.

For more details regarding allergic reaction to latex, refer to *Medical Alert on Latex Products*, FDA, March 29, 1991, in the Reference Manual.

System Controls Affecting Acoustic Output

The initial means by which the user can affect acoustic output are by:

- Selecting a probe
- Selecting an application (category of examination)
- Selecting the imaging mode or particular characteristics

The user controls that may affect the acoustic output are:

- Acoustic output control
- Transmit frequency
- Focal depth
- Sector size
- Range in 2D-Mode, Velocity in Doppler Mode and CFM-Mode (PRF)
- Doppler sample volume (pulse length)
- Steering angle

Probe Selection

As long as the appropriate application is available, any probe can be used with the knowledge that the intensities fall at, or below, those stated in the Acoustic Output Data Tables (see the Reference Manual).

The duration of patient exposure is most likely minimized with the use of a probe that is optimized to provide resolution and focal depth appropriate to the examination.

Application Selection

Selecting the probe and application preset appropriate to a particular ultrasound examination automatically provides acoustic output limits within FDA guidelines for that application. Other parameters that optimize performance for the selected application are also set automatically, and should assist in reducing the patient exposure time. Refer to the *Selecting a Probe Application* section, in *Chapter 2*, of the User's Manual for information on selecting a probe and application preset.

Changing Imaging Modes

Acoustic output depends on the imaging mode selected. The choice of mode (2D-Mode, M-Mode, Doppler Mode or CFM-Mode) determines whether the ultrasound beam is stationary or in motion. This greatly affects the energy absorbed by the tissue.

NOTE: Detailed Acoustic Output Data Tables are provided in the Reference Manual. Refer to Chapter 3, Modes in the User's Manual, for complete information on changing imaging modes.

Transmit Power

In all operating modes, the system has automatic control over transmit power values, depending on the system settings. Only the use of the *Soft Menu rocker*, to access and adjust the **Transmit Power** options, can affect acoustic output.

The default settings of the System are application-dependent and do not exceed the following FDA recommended limits:

FDA Recommended Guidelines		
Application	**ISPTA** (mW/cm^2)	**MI**
Fetal and other*	94	1.9
Cardiac	430	1.9
Peripheral vessels	720	1.9

*Abdominal, intra-operative, pediatric, small organ (breast, thyroid, testes, and so on), neonatal cephalic and adult cephalic.

The Acoustic Output default value is dependent upon the activation of the following factors:

- Probe
- Probe frequency
- Application
- Mode
- Transmit depth

Each of these factors contributes to the overall acoustic default value.

This default level takes effect:

- When the system is first turned on.
- When a new patient is entered.
- When changing from one exam category to another.
- When changing from one application to another.

The default output level is set at the factory and is based on machine settings that yield an optimum image for the type of patient examination. At the same time, the output level is set well below the FDA application specific limits for derated ISPTA Intensity or MI.

The default power is probe and application dependent, and is between 50% and 80% of the maximum allowed power for the selected probe and application. The user can override the default settings, but care should be taken to observe the displayed MI and TI values.

Power-up and user-programmable levels of acoustic output and application-specific acoustic outputs can be found in the Reference Manual.

Combined Modes

When operating in a combined mode, such as 2D and M-Modes, the total acoustic output is comprised of contributions from each individual mode. Depending on the modes in use, either or both output indices may be affected.

Electromagnetic Compatibility (EMC)

AII types of electronic equipment may characteristically cause electromagnetic interference with other equipment, transmitted either through air or connecting cables. The term Electromagnetic Compatibility (EMC) indicates the capability of the equipment to curb electromagnetic influence from other equipment, while at the same time not affecting other equipment with similar electromagnetic radiation.

Radiated or conducted EMC can cause distortion, degradation or artifacts in the ultrasound image that could potentially obscure diagnostic information.

Important: This unit carries the CE mark. The System complies with regulatory requirements of the European Directive, 93/42/EEC, concerning medical devices. It also complies with emission limits for a Group 2, Class A Medical Device as stated in EN 60601-1-2 (IEC 60101-1).

There is no guarantee that interference will not occur in a particular installation. If this equipment is found to cause or respond to interference, which may be determined by turning equipment on and off, qualified service personnel should attempt to correct the problem by one or more of the following measures:

- Reorient or relocate the affected device.
- Increase the separation between the unit and the affected device.
- Power the equipment from a source other than that of the affected device.
- Consult the service representative for further suggestions.

The manufacturer is not responsible for any interference or responses caused by the use of interconnecting cables other than those recommended, or by unauthorized changes or modifications to the unit. Unauthorized changes or modifications could void the user’s authority to operate the equipment.

To comply with the regulations on electromagnetic interference for a Group 2, Class A Medical Device, all interconnecting cables to peripheral devices must be shielded and properly grounded. Use of cables not properly shielded and grounded may result in the equipment causing or responding to radio frequency interference, in violation of the European Union Medical Device Directive and FCC regulations.

Do not use devices which intentionally transmit RF signals, for example, cellular phones, transceivers or radio controlled products, in the vicinity of this equipment, as they may cause performance outside the published specifications. Keep the power to these types of devices turned off when near this equipment.

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